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U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF AGROSTOLOGY.

[Grass and Forage Plant Investigations.]

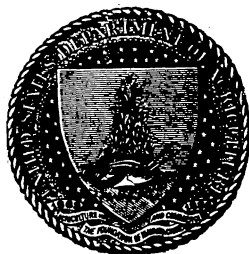
AMERICAN GRASSES—I.

(ILLUSTRATED.)

DESCRIPTIONS OF THE SPECIES,

BY

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AGROSTOLOGIST.



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• LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF AGROSTOLOGY,
Washington, D. C., March 21, 1900.

SIR: I submit herewith copy for a third edition of Bulletin No. 7 of this Division, and recommend its publication, the previous editions having long since been exhausted. In this edition the descriptions of the 302 species illustrated have been enlarged, citations of authorities made more complete, and notes added relative to the more important economic species. Further information relative to the economic grasses may be found in Bulletin No. 14 of the Division. The introductory matter which appeared in the first and second editions is here omitted, as it has been published with the illustrations and descriptions of the genera in *American Grasses III*.

The illustrations are from drawings of carefully selected specimens, the habit sketches being made by Mr. A. H. Baldwin and the enlarged details by myself, with the exception of a few which were made by Mrs. M. D. B. Willis (formerly Miss Baker, of this Division). The engraving is the work of Mr. L. S. Williams and Mr. George P. Bartle.

Respectfully,

F. LAMSON-SCRIBNER,
Agrostologist.

Hon. JAMES WILSON,
Secretary of Agriculture.

DESCRIPTIONS OF THE SPECIES.

METRIC MEASUREMENTS AND THEIR ENGLISH EQUIVALENTS.

The metric system adopted in this bulletin is now quite generally employed in botanical and other scientific publications. For those unfamiliar with this system the English equivalents are added in parentheses, the signs ° for feet, ' for inches, and " for lines or twelfths of an inch, being used.

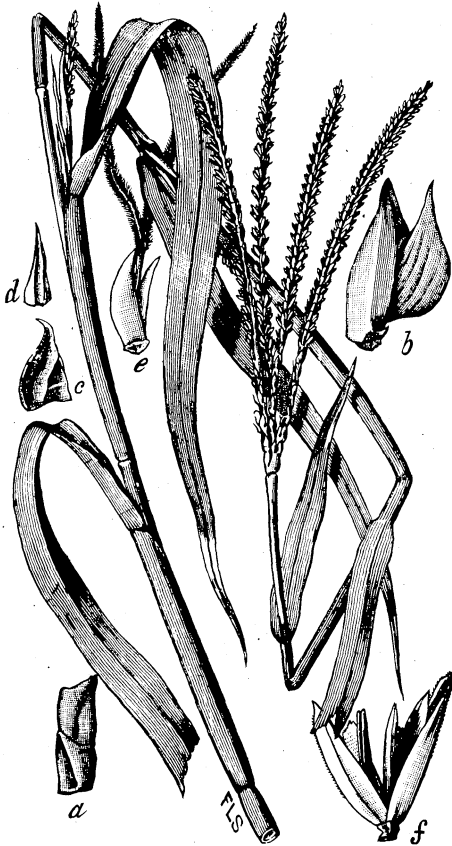


FIG. 1. **TRIPSACUM DACTYLOIDES** Linn. Sp. Pl. ed. 2. 1378. 1763. (*Coix dactyloides* Linn. Sp. Pl. 972. 1753.) GAMA-GRASS.—A stout, coarse, branching perennial 9-24 dm. (3° - 8°) high, with long and rather broad leaves and a spicate inflorescence, the spikes being 2 to 4 on the main stem and usually solitary on the branches. Outer glumes of the staminate spikelets (*f*) 8 mm. ($4''$) long, obtuse, faintly many-nerved.—Low meadows, moist thickets, ditches, etc., Rhode Island to Florida, Kansas, and Texas. (Mexico.) April to October.

This grass affords a large amount of forage, and when young is eaten with avidity by all kinds of stock. Under some conditions it may be cultivated with profit.

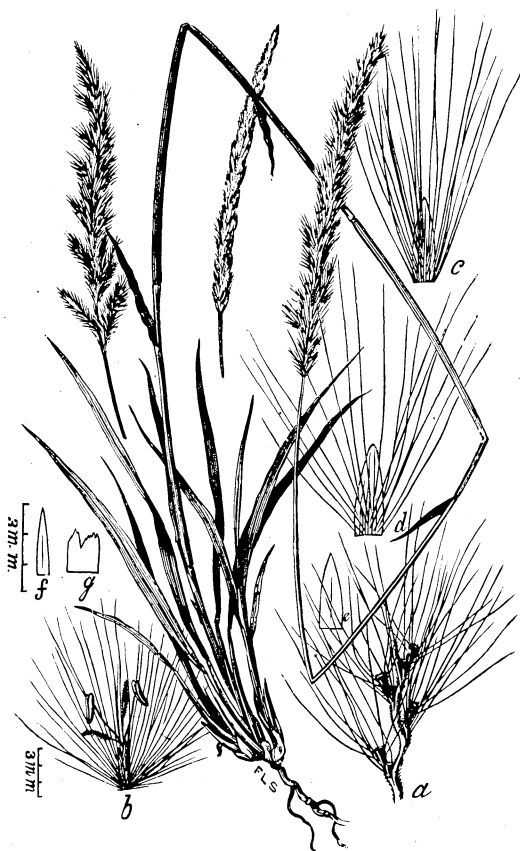


FIG. 2. **IMPERATA HOOKERI** Rupr. in Anderss. Oefvers. K. Vet. Akad. Forh. Stockh. 12: 160. 1855. (*Imperata brevifolia* Vasey, Bul. Torr. Bot. Club, 13: 26. 1866; *I. caudata* Scribn. ibid, 9: 86. 1882, not Trin. 1833.)—A stout, glabrous perennial 5–12 dm. (2° – 4°) high, with strong, creeping rootstocks, flat leaves 10–40 cm. ($4'$ – $16'$) long and densely flowered, hairy panicles 18–30 cm. ($7'$ – $12'$) long. Ligule very short, ciliate; leaf blades 7–12 mm. ($3\frac{1}{2}''$ – $6''$) wide, glaucous, bearded above near the base. Pedicels (*a*) covered with long white hairs. Spikelets (*b*) 3–3.5 mm. ($1\frac{1}{4}''$ – $2''$) long; first and second glumes (*d* and *c*) clothed on the back with long white hairs; third glume (*e*) about as long as the first, the fourth or flowering glume (*f*) a little shorter and narrower.—Borders of alkali springs, etc., western Texas, Nevada, New Mexico, Arizona, southern California, and southward.

A good grass for holding embankments and in its native habitat it furnishes a small amount of good forage.



FIG. 3. **ERIANTHUS COMPACTUS** Nash, Bul. Torr. Bot. Club, **22**: 419. 1895. **DENSELY FLOWERED PLUME-GRASS**.—A stout, erect perennial 12-24 dm. (4° - 8°) high, with long, narrow leaves 15-60 cm. ($\frac{1}{2}$ "-2") long and densely flowered, oblong, brownish or reddish panicles 10-15 cm. ($4'$ - $6'$) long; the branches spreading in anthesis. Spikelets (*a*) about 5 mm. ($2\frac{1}{4}$ "") long, nearly equaling the basal hairs; the first and second glumes (*b*, *c*) with long hairs on the back; third glume (*d*) thin, glabrous; flowering glume awned from the apex (*e*). Lodicules (*f*) ciliate.—Meadows and swamps, mostly near the coast; New Jersey to Virginia and Tennessee. August to October.



FIG. 4. **ERIANTHUS STRICTUS** Baldw. in Ell. Sk. Bot. S. C. & Ga. 1 : 39, 1816.—A stout, erect perennial 12-24 dm. (4° - 8°) high, with long, narrow, flat leaves and strict, bearded (with awns), but not hairy, panicles 20-40 cm. ($8'$ - $16'$) long. Ligule membranaceous, about 2 mm. ($1''$) long, irregularly ciliate; leaf blades 30-60 cm. (1° - 2°) long, narrowed toward the base and tapering into long filiform tips. Spikelets (a) linear-lanceolate, 10 mm. ($5''$) long; first glume (b) bicuspidate at apex; second glume (c) long-acuminate, pointed or subaristate; third glume (d) smooth; fourth or flowering glume (e) shortly bifid at apex; lodicules (f) smooth; awn about 20 mm. ($10''$) long, straight. Hairs at base of the spikelets few and very short.—River bottoms, Tennessee and Georgia to Mississippi and Texas. September to October.



FIG. 5. **MANISURIS COMPRESSA** (L. f.) O. Kuntze, Rev. Gen. Pl. 2 : 779. 1891. (*Rottboellia compressa* L. f. Suppl. 114. 1781; *Hemarthria fasciculata* Kunth.). MAT-GRASS.—A creeping perennial, with ascending and usually much branched, flattened culms 10-14 dm. (3° - 5°) high, and numerous slender spikes (a) 4-8 cm. ($1\frac{1}{2}$ '-3') long, often fasciculate above. Spikelets glabrous, 6-7 mm. ($2\frac{1}{2}$ "-3") long; first glume (b) subcoriaceous, obtuse; second glume (c) of the pedicellate spikelet, acuminate-pointed; inner glumes (d, e) much thinner than the outer ones and obtuse.—River banks, southwestern Texas; tropical and subtropical regions of both hemispheres. September.

Highly esteemed for pasturage and said to remain green throughout the year in dry climates.



FIG. 6. **HACKELOCHLOA GRANULARIS** (Linn.) O. Kuntze, Rev. Gen. Pl. 2: 776. 1891. (*Cenchrus granularis* Linn. Mant. 2: 575. 1771; *Manisuris granularis* Sw. Prod. Veg. Ind. Occ. 25. 1788, in part, Fl. Ind. Occ. 1: 186. 1797.) LIZARD-TAIL GRASS.—A much-branched, leafy annual, 3-12 dm. (1° - 4°) high, with numerous slender spikes (*a*) 1.5-2.5 cm. ($\frac{1}{4}$ '-1') long, in irregular, leafy panicles. Sessile spikelet 1.8-2.5 mm. ($\frac{3}{4}$ "-1 $\frac{1}{4}$ " long, with the back of the obtuse first glume irregularly pitted (*b*, *d*), the second (*e*) oblong-oval, obtuse, as are the much smaller third and fourth glumes (*f*, *g*); first glume of the pedicellate spikelet (*c*) ciliolate along the inflexed margins, and with a distinct callus at the base.—A weed in all tropical countries, extending northward into the warmer parts of the Southern and Southwestern States.

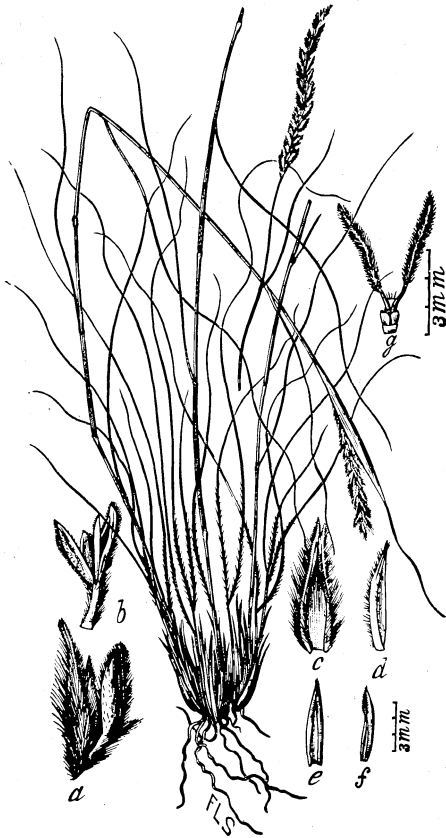


FIG. 7. *ELIONURUS BARBICULMIS* Hack. in DC. Monog. Phan. 6: 339. 1889.—A slender, erect perennial 4–7 dm. (16'–30') high, with very narrow, filiform, hairy leaves and silky-villous, solitary spikes 6–9 cm. ($2\frac{1}{4}$ '– $3\frac{1}{2}$ ') long, which are terminal on the culm or its branches. Sessile spikelet (a) 8–9 mm. ($4''$ – $4\frac{1}{2}''$) long, with the back of the first glume (c) densely clothed with white hairs; second glume narrower and acuminate; third and fourth glumes (e, f) a little shorter than the outer glumes.—Rocky hills and canyons, western Texas to Arizona; northern Mexico. June to September.

Of little or no agricultural value.



FIG. 8. **ANDROPOGON TORREYANUS** Steud. Nom. 1 : 93. ed. 2. 1840. (*A. glaucus* Torr. 1824, not Muhl. 1817; *A. Jamesii* Torr. 1862.) *A. saccharoides torreyanus* Hack. in DC. Monog. Phanerog. Prod. 1 : 495. **TORREY'S BEARD-GRASS**.—A native perennial 3-9 dm. (10° - 30°) high, with rather long, usually glaucous, flat leaves, and narrow, silvery-bearded panicles 5-10 cm. (2'-4') long. First glume (b) of the sessile spikelet (a) 3-4 mm. ($1\frac{1}{4}$ "-2") long; awn (e) 8-16 mm. (4"-8") long, geniculate and twisted below.—Dry prairies and mesas, Kansas to Texas, New Mexico, and Nevada. July to October.

A form with very short or nearly obsolete awns, var. **SUBMUTICUS** Vasey, in DC. Monog. Phan. 6 : 495, occurs in Texas.



FIG. 9.—**ANDROPOGON GLOMERATUS** (Walt.) B. S. P. Prel. Cat. N. Y. 67. 1888. (*Cinna glomerata* Walt. Fl. Car. 39. 1788; *Andropogon macrourus* Michx. 1803.) **BROOK-GRASS**.—A stout perennial 6–15 dm. (2° – 5°) high, with dense, more or less corymbose or elongated panicles, the branches usually very much crowded. Sessile spikelets (a) 3–4 mm. ($1\frac{1}{2}$ "–2") long; awn slender, straight, 10–14 mm. (5"–7") long. The first and second glumes are shown at b and c. Leaves of the sterile shoots 20–50 cm. (8'–20') long.—Low grounds and marshes, southern New York to Florida, southern California and Nevada. (Mexico, Lower California, Cuba, and Jamaica.) September to January.

In the type form the panicle is 20–50 cm. (8'–20') long and caudate. In var. **ABBREVIATUS** (Hack.) (see illustration) the panicle is 10–15 cm. (4'–6') long and obovate-oblong. The sheaths and under surface of the leaves are strongly pruinose in var. **GLAUCOPSIS** (Ell.) Mohr, Bul. Torr. Bot. Club, 24: 21. 1897. The panicle is corymbose and 40 cm. (16') long in var. **CORYMBOSUS** (Chapm.) See fig. 317. Am. Grasses II.



FIG. 10. **ANDROPOGON VIRGINICUS** L. Sp. Pl. 1046. 1753. BROOM SEDGE or BROOM STRAW.—A rigidly erect perennial 6–12 dm. (2° – 4°) high, with the culms flattened near the base, and narrow, elongated, and loosely branched panicles 30–50 cm. ($12'$ – $20'$) long, of silky-bearded racemes 1–4 cm. ($\frac{1}{2}'$ – $1\frac{1}{4}'$) long, partially inclosed within smooth, spathe-like bracts. Sessile spikelet (b) 3–4.5 mm. ($1\frac{1}{8}''$ – $2\frac{1}{4}''$) long; awn straight 8–20 mm. ($4''$ – $10''$) long. Leaves of the innovations 6–10 cm. ($2\frac{1}{2}'$ – $4'$) long.—Old fields and borders of woods, usually in dry soil, Massachusetts to Florida and Texas. (Cuba.) August to October.

Varies with the leaves of the innovations filiform, var. **STENOPHYLLUS** Hack. in DC. Monog. Phan. 6: 411. 1889. A stout form approaching *A. glomeratus* is var. **DITIOR** Hack. l. c. represented by No. 3639d Curtiss N. Am. Pl. See fig. 313. Am. Grasses II.

There is probably no native grass so well known in the South as this. When young it affords excellent pasturage. Bundles of the stems tied together make excellent brooms, which are used in the Southern States.

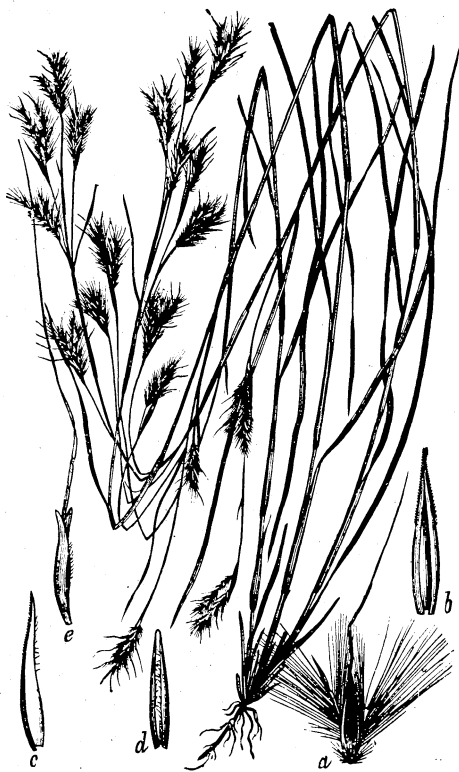


FIG. 11. **ANDROPOGON ARGYRÆUS** Schultes, Mant. 2 : 450. 1824. (*A. argenteus* Ell. Sk. Bot. S. C. & Ga. 1 : 148. 1817, not DC. 1813.) SILVER-BEARD or SILVERY BEARD-GRASS.—A rather slender native perennial 6-9 dm. (2° - 3°) high, with narrow leaves and silky-bearded racemes which are in pairs, terminal on the culm or its branches. Sessile spikelet (a) 5 mm. ($2\frac{1}{4}$ ") long, with the awn of the flowering glume (e) 12-18 mm. ($6''$ - $9''$) long.—In dry sandy soil in open woods and along thicket borders, from Delaware to Missouri and southward to the Gulf. August to October.

Var. **TENUIS** Vasey, Contr. U. S. Nat. Herb. 3 : 12. 1892, has more slender culms, narrower, linear leaves, and fewer spikelets.

A grass closely related to broom sedge but probably of greater agricultural value. It does not infest neglected fields as does that species.

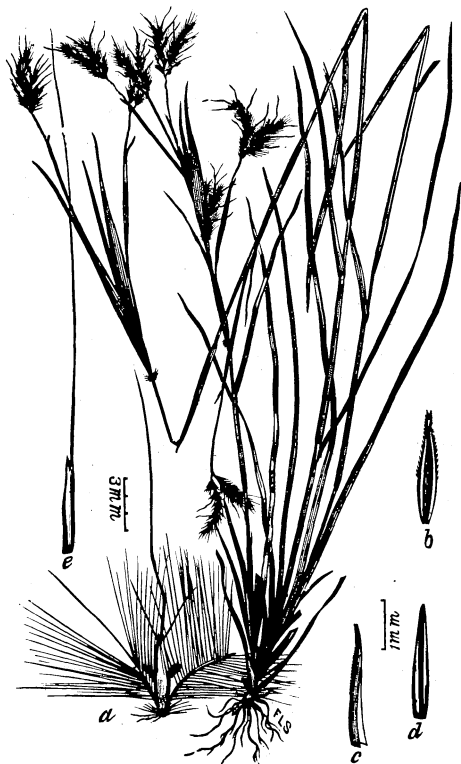


FIG. 12. **ANDROPOGON ELLIOTTII** Chapm. Fl. So. U. S. 581. 1860. **ELLIOTT'S BROOM SEDGE**.—A slender, upright perennial 6–9 dm. (2° – 3°) high, the plumose racemes in pairs or ternate, 2.5–5 cm. (1'–2') long, and subtended by conspicuously inflated upper leaf-sheaths. Sessile spikelet 3–4 mm. ($1\frac{1}{4}$ "–2") long; awn of the fourth glume (e) 12–24 mm. ($6\frac{1}{4}$ "–12") long.—Dry upland woods or low pine barrens, Delaware and Pennsylvania to central Florida and Texas. July to October.

In var. **GRACILIOR** Hack. in DC. Monog. Phan. 6 : 415, 1889, the leaves are 1 mm. ($\frac{1}{4}$ ") wide, and only two or three of the upper leaf sheaths are inflated; awns 13–15 mm. ($6\frac{1}{2}$ "– $7\frac{1}{2}$ ") long. Var. **GLAUDESCENS** Scribn. Bul. Torr. Bot. Club, 23 : 145. 1896 (*A. scribnerianus* Nash, Bul. N. Y. Bot. Gard. 1 : 423. 1900), is a glaucous, less branched form, with stouter and more densely bearded racemes; var. **LAXIFLORUS** Scribn. l. c. 146 (*A. campyloracheus* Nash, Bul. N. Y. Bot. Gard. 1 : 431. 1900), has the lower sheaths pubescent, the culms bearded below the nodes, the upper sheaths remote, and racemes 5–7 cm. (2'–3') long. Florida.



FIG. 13. **ANDROPOGON SCOPARIUS** Michx. Fl. Bor. Am. 1: 87. 1803. **LITTLE BLUE-STEM**.—A rather slender perennial 4-12 dm. (1° - 4°) high, the solitary racemes 2.5-5 cm. ($1'$ - $2'$) long, terminating the culms and branches. Sessile spikelet about 6 mm. ($3''$) long, the pedicellate spikelet 2-3 mm. ($1''$ - $1\frac{1}{4}''$) long; awn 10-15 mm. ($5''$ - $8''$) long.—Dry fields and borders of woods, New Brunswick westward to the Saskatchewan, southward to Florida, Texas, and southern California. (Mexico.) July to October.

Var. **FLEXILIS**. (Bosc.) Hack. in DC. Monog. Phan. 6: 384. 1889, has long-exserted racemes; spikelets 5.5 mm. ($2\frac{1}{4}''$) long; var. **CÆSIA** Hack. l. c. has the sheaths and spathes pruinose; var. **SIMPLICIOR** Hack. l. c. has the racemes usually solitary at each node; spikelets 8 mm. ($4''$) long.

This grass often forms a large proportion of the so-called prairie hay of the West.



FIG. 14. **ANDROPOGON PROVINCIALIS** Lam. Encycl. 1: 376. 1783. (*A. furcatus* Willd. Sp. Pl. 4: 919. 1815.) BIG BLUE-STEM.—A stout perennial 6-16 dm. (2° - 5°) high, with long leaves, and rather thick spikes 3-10 cm. ($1\frac{1}{4}$ '-4') long. Sessile spikelet (a) 8-10 mm. ($4''$ - $5''$) long; awn of the fourth or flowering glume (e) 10-15 mm. ($5''$ - $8''$) long, loosely spiral; first and second glumes (b, c) nearly equal and but slightly exceeding the third (d).—From the Rocky Mountains eastward to the Atlantic and southward to the Gulf of Mexico. August to October.

Var. *FURCATUS* Hack. in DC. Monog. Phan. 6: 443. 1889, base of the pedicellate spikelet is glabrous; var. *LINDHEIMERI* Hack l. c. the base of the leaves are densely barbate with long hairs; spikelets 10 mm. ($5''$) long; in var. *PYCNANTHUS* Hack l. c. the leaves are glabrous, spikelets 7-8 mm. ($3\frac{1}{4}$ - $4''$) long, densely imbricated.

This grass grows in a great variety of soils and is especially abundant and highly valued for hay in the prairie regions.



FIG. 15. **ANDROPOGON NUTANS AVENACEUS** (Michx.) Hack. in DC. Monog. Phan. 6 : 530. 1889. (*A. avenaceus* Michx. Fl. Bor. Am. 1 : 58. 1803; *Sorghum avenaceum* Chapm. 1860; *Chrysopogon avenaceus* Benth. 1881.) INDIAN GRASS or BUSHY BLUE-STEM.—A stout perennial 12-18 dm. (4° - 6°) high, with long leaf blades, and long, rather dense, usually somewhat nodding brownish panicles. Spikelets (a) 6-8 mm. ($3''$ - $4''$) long; awn of the fourth glume (e) 9-20 mm. ($4\frac{1}{2}''$ - $10''$) long; first, second, third, and fourth glumes (b, c, d, e) nearly equal in length.—Dry fields, glades, and borders of woods, Ontario to South Dakota and Manitoba, south to Florida, Texas, and Arizona. (Mexico, Central and South America.) July to October.

Abundant on the western prairies and highly valued for hay.

In variety **LINNEANUS** Hack. l. c. (*Sorghum nutans* Chapm.) the awns are 24-30 mm. ($12''$ - $15''$) long.

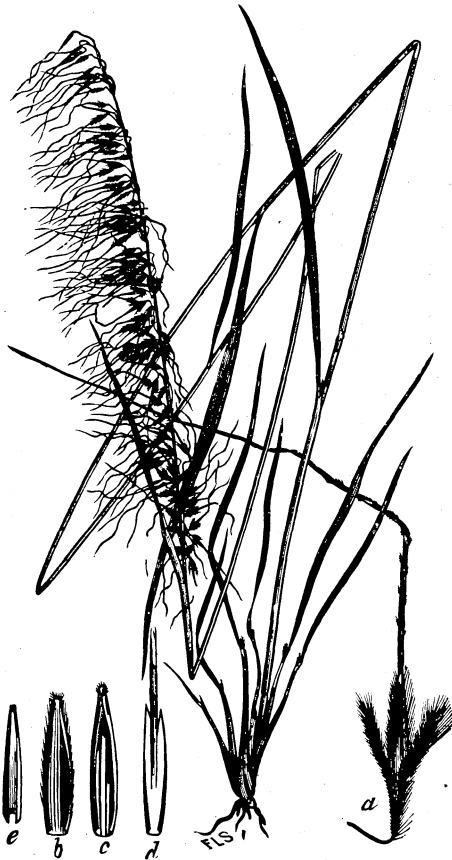


FIG. 16. **ANDROPOGON UNILATERALIS** Hack. in DC. Monog. Phan. 6: 533. 1889. (*Sorghum secundum* Chapm. Fl. So. U. S. 581. 1860; not *A. secundus* Kunth, 1833.) **BANNER SORGHUM**.—A rather stout, erect perennial 6-12 dm. (2° - 4°) high, with narrow, one-sided, many-flowered panicles 18-25 cm. (7'-10') long. Ligule 4-5 mm. ($2''$ - $2\frac{1}{4}''$) long; leaf blades flat or convolute when dry, 2-5 mm. ($1''$ - $2\frac{1}{4}''$) wide. Spikelets (a) linear-lanceolate, 7 mm. ($3\frac{1}{4}''$) long; first glume (b) coriaceous, a little shorter than the second glume (c); awn of the fourth glume (d) 30-35 mm. ($15''$ - $17''$) long, stout, and spirally twisted below.—Low pine lands, South Carolina and Florida. June to October.



FIG. 17. **ANDROPOGON PAUCIFLORUS** (Chapm.) Hack. in DC. Monog. Phan. 6: 548. 1889. (*Sorghum pauciflorum* Chapm. Bot. Gaz. 3: 20. 1878.) FEW-FLOWERED SORGHUM.—A rather stout, branching, leafy annual, 6–12 dm. (2°–4°) high, with loosely few-flowered panicles and long-awned spikelets (*a*). Awns 12–15 cm. (5'–6') long. Sessile spikelet with a densely barbate callus 6 mm. (3'') long.—Dry fields, Florida. (Cuba.) October.



FIG. 18. **HILARIA CENCHROIDES** H. B. K. Nov. Gen. et Sp. Pl. 1: 117. *t.* 37. 1815. CREEPING or CURLY MESQUITE.—A slender, creeping perennial, with upright leafy branches 1-3 dm. (4'-12') high, and slender spikes 3-4 cm. (1'-2') long. Spikelets in groups of threes (*a*) connate below, the outer ones (*b*) staminate, the central inner one (*d*) pistillate, not hairy at the base. A staminate spikelet with the outer glumes removed is shown at *c*.—Dry prairies, mesas, and foothills, Texas to Arizona (Mexico). April to October.

One of the most valuable of the native grasses for grazing.



FIG. 19. **HILARIA MUTICA** (Buckl.) Benth. Journ. Linn. Soc. **19**: 62. 1881. (*Pleuraphis mutica* Buckl. Proc. Acad. Nat. Sci. Phil. **1832**: 95. 1862.) **BLACK GRAMA**.—A smooth, branching perennial 4-6 dm. (16'-24') high, with densely flowered, usually straw-colored, cylindrical spikes about 5 cm. (2') long. Spikelets (a) 4-6 mm. (2"-3") long with a tuft of long hairs at base, middle spikelet (c) perfect, lateral ones (b) staminate.—Dry mesas, Texas to southern California. May to September. Valued for forage, especially for grazing.



FIG. 20. **HILARIA JAMESII** (Torr.) Benth. Journ. Linn. Soc. **19**: 62. 1881. (*Pleuraphis jamesii* Torr. Ann. Lyc. N. Y. **1**: 148. t. 10. 1824.) **BLACK BUNCH-GRASS**.—A rather coarse, branching perennial 3-5 dm. (12'-20') high, with erect, often purplish spikes 5-8 cm. (2'-3½') long. Spikelets (a) 8-10 mm. (¼"-5") long, hairy at base. Staminate spikelets (b) 2-flowered; empty glumes 5-nerved the outer with an awn from the back longer than the spikelet, the inner unawned.—Mesas and table-lands of southern Colorado and Utah to New Mexico and southern California. March to July. A valuable hay or pasture grass.



FIG. 21. **HILARIA RIGIDA** (Thurb.) Scribn. Bul. Torr. Bot. Club, 9: 33. 1882. (*Pleuraphis rigida* Thurb. in S. Wats. Bot. Calif. 2: 293. 1880.) GALLETA.—A coarse, much-branched, and woody perennial 6 dm. (2°) high, growing in great clumps, somewhat resembling dwarf bamboos in habit. Spikes 5-8 cm. (2'-3¼') long. Spikelets (b) in groups of three, sessile, hairy at base, lateral ones (c) staminate, 2- to 3-flowered, middle one (d) perfect and 1-flowered.—Deserts, southern Utah to Arizona, and southern California. (Lower California.) May to July.

A valuable forage plant in the desert regions where it grows.



FIG. 22. **REIMARIA OLIGOSTACHYA** Munro in Benth. Journ. Linn. Soc. 19: 34. 1881. CREEPING REIMARIA.—An extensively creeping perennial, with spreading flat leaves and upright flowering branches 2-4 dm. (8'-16') high, bearing two to four slender spikes 4-7 cm. (1½'-3') long. Spikelets (2, 3) acute, appressed to the flexuous rachis in two rows, as shown in (1).—Ditches and brackish river shores, often in water, eastern Florida. (Cuba.) April to September.

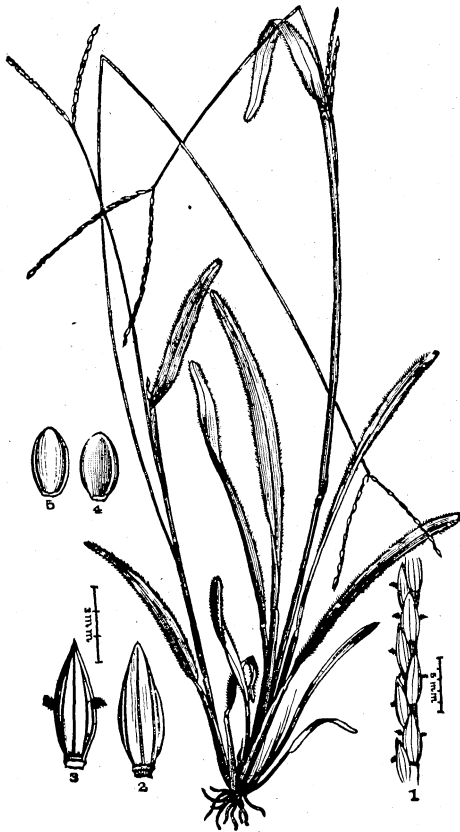


FIG. 23. **PASPALUM PASPALOIDES** (Michx.) Scribn. Mem. Torr. Bot. Club, 5: 29. 1894. (*Digitaria paspaloides* Michx. Fl. Bor. Am. 1: 46. 1803; *P. elliotii* S. Wats.; *P. digitaria* Poir.) **ELLIOTT'S PASPALUM**.—A soft perennial grass 3–8 dm. (12'–30') high, geniculate and more or less creeping at the base, with rather broad, flat, obtuse leaves and slender spikes, 7–10 cm. (3'–4') long, mostly in pairs from slender peduncles. Spikelets (2, 3) about 4 mm. (2") long, lanceolate acute; empty glumes thinly pubescent, longer than the obtuse flowering glumes (4). A portion of a spike is shown at (1).—Borders of ponds and ditches, and in low pine barrens near the coast, Maryland to Texas. April to August.



FIG. 24. **PASPALUM COMPRESSUM** (Sw.) Nees in Trin. Gram. Panic. 96. 1826. (*Milium compressum* Sw. Prod. Veg. Ind. Occ. 24. 1788; *P. platycaule* Poir.) LOUISIANA or CARPET-GRASS.—A slender, erect, or more frequently prostrate and extensively creeping perennial, rooting at the nodes and sending up numerous leafy or flower-bearing branches 1.5-6 dm. (6'-24') high, with 2 to 6 subdigitate slender, approximate spikes 7-10 cm. (2½'-4') long. Spikelets (*a*, *b*) small, ovate, about 2 mm. (1") long, acute; the outer glumes slightly exceeding the flowering glume (*d*). A portion of the spike is shown at *a*.—Low ground and moist pastures, abundant near the coast from Virginia to Texas. (Mexico, Central and South America, and West Indies.) April-October.

The prostrate creeping stems spread rapidly and soon form a dense carpet-like growth, crowding out all other vegetation. It is regarded as one of the most valuable native pasture grasses of the States bordering the Gulf, and under some circumstances makes a good lawn grass. It is readily propagated either by sets or seeds.

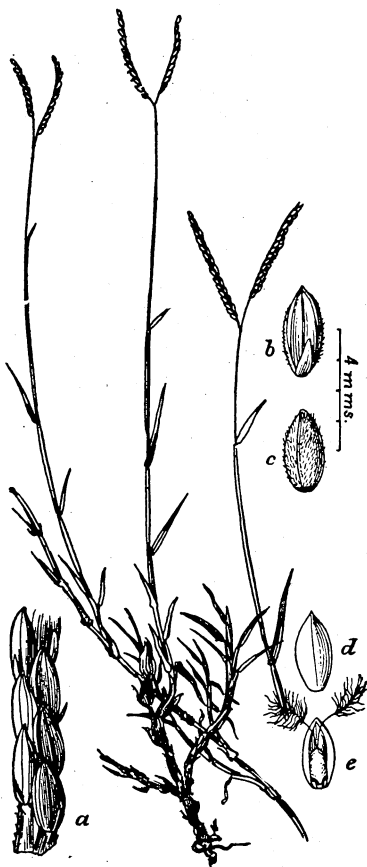


FIG. 25. **PASPALUM DISTICHUM** L. Amoen. Acad. 5: 391. 1759. KNOT-GRASS.—A low, creeping, somewhat succulent perennial, with flat leaves and two spikes 3.5–6 cm. ($1\frac{1}{4}$ – $2\frac{1}{4}$ ') long at the apex of the upright flower-bearing branches, which are 1–3 dm. (4'–12') high. Racemes 3–5 cm. (1'–2') long; spikelets (b, c) in two rows, ovate, acutish; empty glumes 3- to 5-nerved, about 2 mm. ($1''$) long, thinly and minutely pubescent.—Ditches and muddy or sandy shores, Virginia and Missouri to Florida, Texas, and southern California, northward on the Pacific coast to Oregon. (Widely distributed in tropical and subtropical regions of both hemispheres.) April to October.

Knot-grass has much the same habit of growth as Bermuda-grass, and is valuable for holding loose sands along river banks and margins of ponds. The somewhat succulent stems and tender leaves make excellent grazing.



FIG. 26. *PASPALUM SETACEUM* Michx. Fl. Bor. Am. 1 : 43. 1803. SLENDER PASPALUM.—A slender, erect, or ascending native perennial, usually about 6 dm. (2^o) high, with narrow, flat, hairy leaves, and slender, small-flowered spikes, the terminal one long-peduncled, 5-10 cm. (2'-4') long; spikelets (b, c) in pairs in two rows, short-pedicelled, ovate, obtuse, 1.5 mm. ($\frac{3}{8}$ ") long; outer glumes finely pubescent and glandular-spotted.—Dry, sandy fields and pine barrens, Massachusetts to northeastern Nebraska, Texas, and Florida. April to October.



FIG. 27. **PASPALUM LÆVE** Michx. Fl. Bor. Am. 1: 44. 1803. SMOOTH PASPALUM.—Perennial, with ascending culms, often geniculate at base, 3-9 dm. (1° - 3°) high, with smooth leaf-sheaths and blades, and 3 to 7 spreading spikes 5-10 cm. (2'-4') long, hairy in the axils. Rachis (a) narrow and flexuous; spikelets (b, c) in two rows about 2.5 mm. ($1\frac{1}{4}$ ") long, smooth, roundish; empty glumes 5-nerved.—In variety **PILOSUM** Scribn. Bul. Tenn. Agr. Exp. Sta. 7: 34. 1894, the sheaths are pilose, as are the narrow and elongated leaves.—Low, often wet ground; Rhode Island to Florida; eastern Texas, and Missouri. June to October.

A late summer grass, well liked by stock. In cultivated ground, especially in lawns, it is often a troublesome intruder.

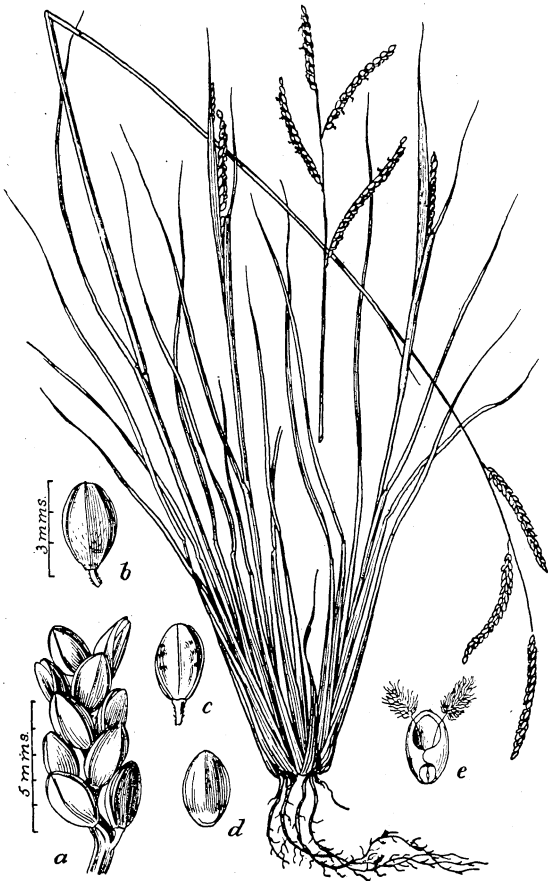


FIG. 28. **PASPALUM PLICATULUM** Michx. Fl. Bor. Am. 1: 45. 1803. (*P. undulatum* Poir.) WRINKLED-FLOWERED PASPALUM.—An erect or ascending perennial 3-9 dm. (10° - 30°) high, with long, smooth leaves and 5 to 7 densely flowered racemes 4-5 cm. ($1\frac{1}{4}$ '-2') long. Spikelets (*a*, *b*, *c*) apparently in three rows, obtuse, 2-2.5 mm. ($1''$ - $1\frac{1}{4}''$) long. The second glume is usually plicate or wrinkled along the margins. The dorsal view of the third or flowering glume is shown at *d*, and the anterior view of a palea at *e*.—Dry fields and open pine woods, Georgia and Florida to Texas (Mexico, Central and South America, and West Indies). April to October.



FIG. 29. **PASPALUM DIFFORME** Le Conte, Journ. Phys. 91: 284. 1820.—A stout perennial, 6–12 dm. (2° – 4°) from creeping rootstocks, with flat, rather rigid leaves 12–15 cm. (5'–6') long. Spikes two to four, 3.5–8 cm. ($1\frac{1}{4}$ '– $3\frac{1}{4}$ ') long, thick, firm; spikelets (a, b, c) 3 mm. ($1\frac{1}{4}$ ") long, in two or three rows, obtuse, smooth; empty glumes 3-nerved. Allied to *P. floridanum*, but less robust, with shorter leaves and spikes.—Dry pine barrens near the coast, North Carolina to Florida and westward, to Texas. June to October.

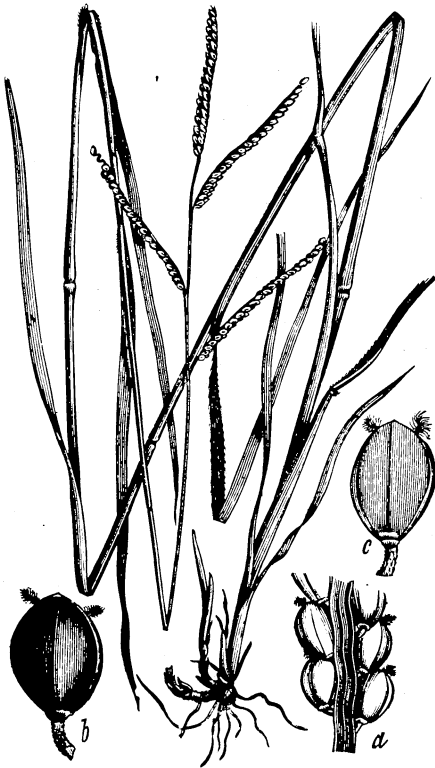


FIG. 30. **PASPALUM FLORIDANUM** Michx. Fl. Bor. Am. 1: 44. 1803. **FLORIDA PASPALUM.**—A stout erect perennial 9-15 dm. (3° - 5°) high, with smooth or hairy leaves 30-60 cm. (1° - 2°) long. Leaves and sheaths villous or in var. **GLABRATUM** Engel., glabrous. Spikes 3 to 7, erect or spreading, 7-12 cm. ($3'$ - $5'$) long, thick; spikelets (b, c) in three rows, about 4 mm. ($2''$) long, broadly oval, obtuse; outer glumes smooth, often pruinose.—Dry and moist low ground, Delaware to Florida, Texas, Kentucky, and Indian Territory. June to October.



FIG. 31. **PASPALUM DILATATUM** Poir. in Lam. Encycl. 5: 35. 1804 (*P. ovatum* Nees, Agrost. Bras. 43. 1829.) **LARGE WATER-GRASS.**—A somewhat coarse, leafy perennial, growing in clumps 6-15 dm. (2° - 5°) high, bearing two to ten more or less spreading spikes 5-10 cm. ($2'$ - $4'$) long. Spikelets (*a*, *b*) in four rows 3 mm. ($1\frac{1}{4}''$) long, ovate, acute, villous on the margins.—In meadows and waste ground and along ditches, southeastern Virginia to Florida, west to Texas; apparently naturalized (South America). July to October.

Considered a good pasture grass; endures summer heat and drought very well; and is especially valuable for furnishing late summer and autumn feed, during which period it makes its principal growth.

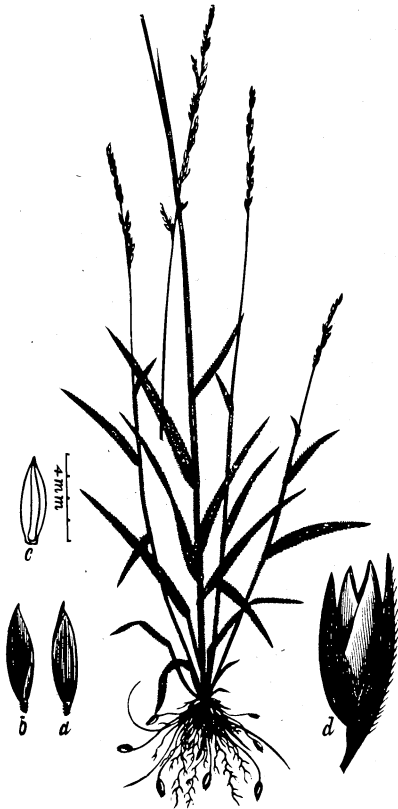


FIG. 32. **AMPHICARPON PURSHII** Kunth, Rev. Gram. 1: 28. 1835. **PURSH'S AMPHICARPON**.—An erect tufted perennial 3-6 dm. (1° - 2°) high, with hispid sheaths and leaves and contracted panicles. Fertile spikelets (*d*) solitary and subterranean, about 6 mm. ($3''$) long, acute, the outer glumes many-nerved, the inner one becoming indurated in fruit. The spikelets (*a, b*) of the terminal panicles smaller, about 4 mm. ($2''$) long, and outer glumes 5-nerved.—Pine barrens and cranberry bogs near the coast, New Jersey. August to September.

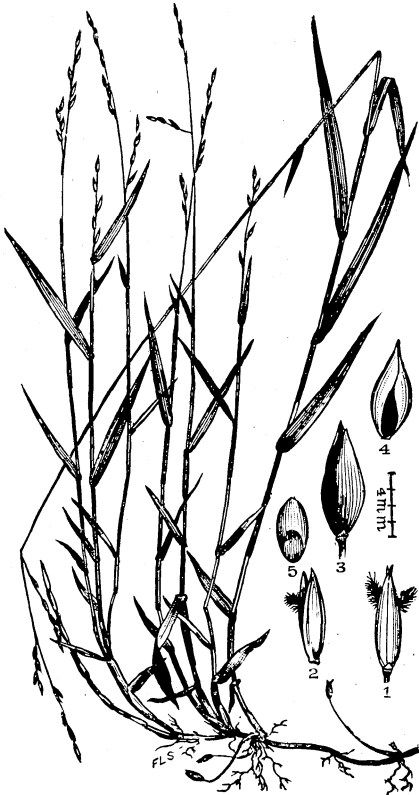


FIG. 33. **AMPHICARPON FLORIDANUM** Chapm. Fl. So. U. S. 572. 1860. **FLORIDA AMPHICARPON**.—A pale-green, smooth perennial 3-9 dm. (1°-3°) high, from creeping rootstocks, with rigid, flat, linear-lanceolate leaves, and narrow panicles 10-20 cm. (4'-8') long. In the terminal panicles the spikelets (1, 2) are oblong, acute, about 6 mm. (3") long, with nearly equal and 5-nerved outer glumes. Fertile spikelets on subterranean branches, much as in *Amphicarpum purshii*.—Moist pine barrens and sandy shores, Florida (throughout the State). July to September.

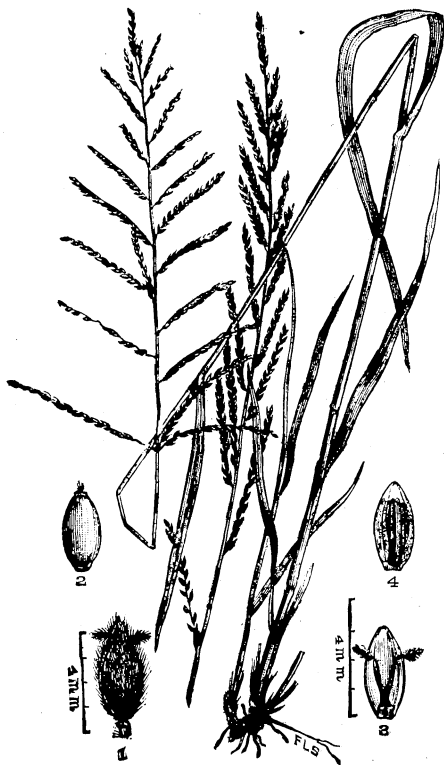


FIG. 34. **ERIOCHLOA MOLLIS** (Michx.) Kunth, Rev. Gram. 1: 30. 1835. (*Panicum molle* Michx. Fl. Bor. Am. 1: 47. 1803.) **SOFT WOOL-GRASS**.—A perennial 10–20 dm. (3° – 7°) high, with long, flat leaves and open panicles of numerous, more or less spreading racemes 4–8 cm. ($1\frac{1}{2}$ – $3'$) long; upper part of the stem and rachis downy or pubescent. Spikelets (1) 4–5 mm. ($2''$ – $3''$) long, acute, pubescent; third glume (4) inclosing a staminate flower. At 2 is shown a dorsal view of the fourth glume, and the palea inclosing the pistil is shown at 3.—Brackish marshes and shores, South Carolina to Florida. April to September.



FIG. 35. *ERIOCHLOA PUNCTATA* (L.) W. Hamilt. Prod. Pl. Ind. Occ. 5. 1825. (*Milium punctatum* L. Amoen. Acad. 5: 392. 1759.) EVERLASTING-GRASS.—A rapid-growing, smooth, and somewhat succulent perennial, with more or less branching culms 6-12 dm. (2°-4°) high, flat leaves, and narrow panicles 5-10 cm. (2'-4') long. Spikelets (b, c) short pediceled, about 4 mm. (2") long: empty glumes oblong-lanceolate, the upper short-awned; flowering glumes (d) about one-third shorter than the outer ones. A portion of the rachis is shown at a.—Low, rich land, moist soil, prairies, etc., Kansas to Texas and Arizona. (Tropical America, Asia, and Australia.) June to September.

In Australia this is regarded as an excellent pasture grass. In Arizona it grows throughout the valleys in irrigated soil or in the rich moist places of the plains, affording rich and abundant grazing.



FIG. 36. **ERIOCHLOA LEMMONI** Vasey & Scribn. Bot. Gaz. 9: 185. 1884. **LEMMON'S WOOL-GRASS**.—A softly pubescent perennial 3-6 dm. (1° - 2°) high, with rather broad leaves and a short panicle composed of about six spreading, loosely-flowered spikes, 2-3 cm. ($\frac{1}{4}$ '- $1\frac{1}{4}$ ') long. Spikelets (a, b) short-pedicelled, ovate-lanceolate, acute, 4 mm. ($2''$) long, spreading nearly at right angles to the rachis; flowering glume (d) one-fourth shorter than the others, tipped with a short tuft of hairs and mucro.—Arizona, New Mexico. (Northern Mexico.) August to November.

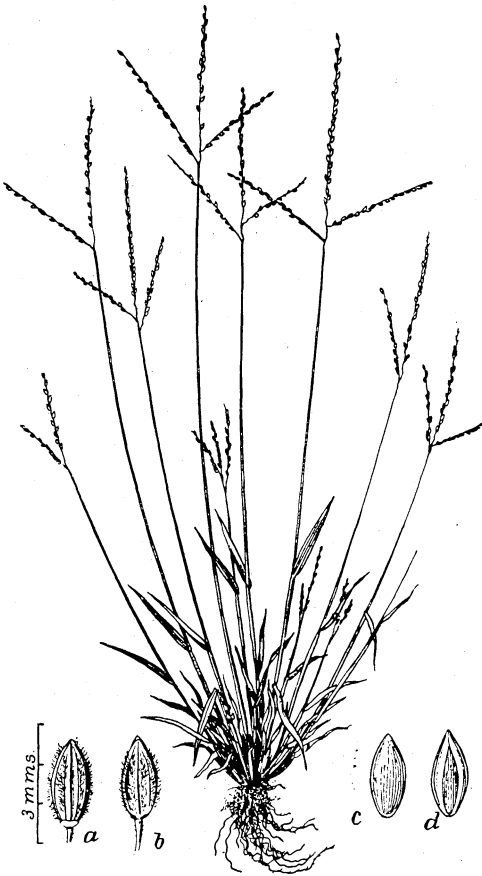


FIG. 37. **PANICUM HUMIFUSUM** (Pers.) Kunth, Rev. Gram. 1 : 33. 1835. (*Digitaria humifusa* Pers. Syn. 1 : 85. 1805; *Panicum lineare* Krock. 1787, not Linn. 1762; *Panicum glabrum* Gaud. 1811; *Syntherisma linearis* Nash.) SMOOTH CRAB-GRASS.—A slender, glabrous annual 1.5–3.5 dm. (6'–14') high, with culms which are much branched below, flat glabrous leaves, and two to six slender diverging spikes, usually 3–6 cm. (1½'–2¼') long. Spikelets (a, b) 2–2.5 mm. (1"–1¼") long, subacute, the 3-nerved second glume and 7-nerved third glume about as long as the floral glume (c, d), pubescent on the margins and between the nerves; first glume very small or wholly wanting.—Naturalized in waste and cultivated lands; Nova Scotia to Ontario and South Dakota, south to Florida and Texas. (Europe.) August to October.

Of little or no agricultural value.



FIG. 38. **PANICUM SEROTINUM** (Walt.) Trin. Gram. Panic. 166. 1826. (*Syntherisma serotina* Walt. Fl. Car. 76. 1788; *Digitaria serotina* Michx. Fl. Bor. Am. 1: 46. 1803.) **LITTLE CRAB-GRASS**.—An extensively creeping annual or biennial, with flat, hairy leaves and slender racemes 3-10 cm. ($1\frac{1}{4}'$ - $4'$) long, digitate at the apex of the ascending culms, which are 1-3 dm. ($\frac{1}{4}$ '- $12'$) high. Spikelets (2, 3) about 1.5 mm. ($\frac{1}{8}$ ") long, acute, with pubescent, unequal, empty glumes, of which the first is wanting, the second 3-nerved and one-third as long as the flowering glume.—Low, sandy ground, roadsides, pastures, and cultivated fields near the coast, Delaware to Mississippi; on ballast at Philadelphia. June to August.

Of no agricultural value.



FIG. 39. **PANICUM GRACILLIMUM** Scribn. Bul. Torr. Bot. Club, **23** : 146. 1896. (*Syntherisma gracillima*, Nash, *ibid*, **25** : 295. 1898.) **SLENDER PANICUM**.—A slender perennial 3-9 dm. (1° - 3°) high, with very narrow, elongated leaves, and small, glabrous spikelets (*a*, *b*, *c*), racemose along the main axis and its branches, which are approximate near the apex of the culm. Empty glumes two (the first wanting), the rounded obtuse second glume one-fourth to one-half as long as the fourth, the 5-nerved acute third glume nearly as long as the striate, dark brown flowering glume (*d*).—High pine lands, Lake County, Florida. (1192 Nash.) July.

Of no agricultural value.



FIG. 40. **PANICUM LEUCOCOMUM** Scribn. U. S. Dept. Agr. Div. Agros. Bul. 7 : 58, ed. 2, 1898. (*P. phæothrix* in ed. 1, not Trin.; *Syntherisma leucomoma* Nash, Bul. Torr. Bot. Club, 25 : 295. 1898.) SILVERY CRAB-GRASS.—A slender perennial about 9 dm. (3°) high, with long, narrow leaves and very slender, rather loosely flowered racemes 10-20 cm. (4'-8') long, approximate near the apex of the culm. Spikelets (*a, b, c*) 2.3-2.5 mm. (1"-1½") long, acute, the first glume wanting, the second a little shorter than the third, both densely clothed on the margins and internerves with glandular-tipped, white hairs. The flowering glume is shown by *d* and *e*.—High pine lands, Florida. (Nash, 1155.) July.



FIG. 41. **PANICUM PASPALOIDES** Pers. Syn. 1: 81. 1805. (*P. truncatum* Trin. Icon. Gram. 2: t. 168. 1829.) SOUTHERN WATER-GRASS.—A rather stout, smooth, and more or less branching perennial 6–10 dm. (2° – 3°) high, often creeping at the base, with long, flat leaves 15–25 cm. (5'–10') long, and ten to twenty alternate, one-sided spikes 2–3 cm. ($\frac{3}{4}$ '– $1\frac{1}{4}$ ') long. Spikelets (*a*, *b*, *c*) 3 mm. ($1\frac{1}{4}$ ") long, oblong, obtuse, with the obtuse second glume a little shorter than the fourth glume (*d*, *e*), which is equaled by the third; first glume broadly truncate 0.5 mm. ($\frac{1}{4}$ ") long.—About ponds and in standing water, southern Florida; Texas. (In tropical countries of both hemispheres.) May to July.



FIG. 42. **PANICUM LANATUM** Rottb. Descr. Pl. 3 (?). 1776. (*P. leucophæum* H. B. K. Nov. Gen. et Sp. Pl. 1: 97. 1815.) COTTON-GRASS.—A rather stout, more or less branching leafy perennial 6-12 dm. (2° - 4°) high, with narrow, soft-hairy panicles, the erect branches 5-10 cm. ($2'$ - $4'$) long. Spikelets (*a*) linear-lanceolate, acuminate, about 4 mm. ($2''$) long; lower glume minute; second and third glumes (*b*, *c*) clothed with long soft hairs; fourth glume (*d*) a little shorter than the second and third. The palea is shown at *e* and the grain at *f*.—Cultivated ground, river banks, and coral soil on keys, central and southern Florida; on ballast at Mobile, Ala. (Widely distributed in tropical America; Australia; Africa.) May to October.

When abundant, this grass yields excellent pasturage.



FIG. 43. **PANICUM GROSSARIUM** L. Amœn. Acad. 5 : 392. 1759. JAMAICA CRAB-GRASS.—Apparently an annual, with glabrous, much-branched, ascending culms 3–6 dm. (1° – 2°) long, broad, lanceolate leaves and spreading panicles of a few simple racemes 3–8 cm. ($1\frac{1}{4}$ '– $3'$) long. Spikelets (*a*, *b*) usually in pairs, ovate, acute 4 mm. ($2''$) long; first glume 3-nerved, obtuse; second and third glumes 5-nerved, acuminate, minutely pubescent, a little longer than the obtuse flowering glume (*c*). Leaves 4–10 cm. ($1\frac{1}{4}$ '– $4'$) long, 1.5 cm. ($7\frac{1}{4}''$) wide.—Ballast ground, Philadelphia. Adventive. (West Indies.) September.

Apparently valuable as a forage plant.



FIG. 44. **PANICUM TEXANUM** Buckl. Prel. Rept. Geol. and Agric. Surv. Texas, 3. 1866. **TEXAS MILLET** or **COLORADO GRASS**.—A branching, leafy annual 6-12 dm. (2° - 4°) high, with flat, scabrous leaves and narrow panicles 15-20 cm. (6'-8') long. Panicles with five to ten erect, rather slender, closely flowered branches, 1.5-8 cm. ($\frac{1}{4}$ '-3') long. Spikelets (a, b) single or in pairs, alternate along the angular rachis, oblong, acute 4-5 mm. ($2''$ - $2\frac{1}{4}''$) long; first glume 5-nerved, one-half to two-thirds as long as the spikelet; second and third glumes 5 to 7 nerved, pubescent exceeding the transversely wrinkled and obtuse fourth or flowering glume (c).—Texas, especially along the Colorado River bottoms, September.

A valuable, nutritious grass of rapid growth, and upon good soil yields a large amount of excellent hay. It reseeds itself readily and may be cut twice or three times during the season.



FIG. 45. **PANICUM OBTUSUM** H. B. K. Nov. Gen. et Sp. Pl. 1: 98. 1815. VINE MESQUITE.—A stoloniferous wiry perennial, the runners often 24-30 dm. (8°-10°) long; the upright, flowering branches 3-6 dm. (1°-2°) high. Panicle of three to five erect racemes, the lower ones about 2 cm. (1') long, the upper very short. Spikelets (a, b) oblong, obtuse, 3 mm. (1½") long; first glume two-thirds as long as the 7-nerved second glume, which slightly exceeds the flowering glume (c). The palea is shown at d.—Irrigated lands, low valleys, chiefly in the shade of trees and shrubs, Kansas and Colorado to Texas, New Mexico, Arizona, and southward. June to September.

This is the "Wire grass" of New Mexico. It is readily propagated by seed, which is produced abundantly, and the grass probably possesses much agricultural value.



FIG. 46. **PANICUM STENODES** Griseb. Fl. Brit. W. Ind. 547. 1864 (*P. anceps strictum* Chapm. Fl. So. U. S. 573. 1860.) SMALL-JOINTED PANIC-GRASS.—A slender, erect, glabrous perennial, with wiry stems 5-8 dm. (20'-30') high, rigid, involute leaves, and narrow, simple panicles 4-8 cm. (1½'-3') long. Spikelets (1, 2) about 2 mm. (1") long, lanceolate, acute; first glume one-half as long as the spikelet, the second and third glumes 5-nerved, acute, a little longer than the obtuse fourth glume (3).—Moist, sandy pine barrens near the coast, Florida to Texas. (Cuba and Santo Domingo.) July to October.



FIG. 47. **PANICUM GIBBUM** Ell. Sk. Bot. S. C. and Ga. 1 : 116. 1817. GIBBOUS PANIC-GRASS.—A stoloniferous, branching perennial 3-9 dm. (1° - 3°) high, with narrowly lanceolate, flat leaves, and densely flowered spike-like panicles 10-15 cm. ($4'$ - $6'$) long, the appressed branches 2-5 cm. ($\frac{1}{2}'$ - $2'$) long. Spikelets (*a*, *b*) glabrous, about 3 mm. ($1\frac{1}{4}''$) long, oblong, obtuse; the lower glume 3-nerved, one-fourth as long as the second, which is strongly 11-nerved and gibbous at the base, and nearly twice as long as the fourth or flowering glume (*d*). The palea of the 7-nerved third glume is shown at *c*.—Low, wet grounds, Virginia to Florida, Tennessee, Louisiana, and Indian Territory. (Cuba.) June to October.



FIG. 48. **PANICUM MELICARIUM** Michx. Fl. Bor. Am. 1: 50. 1803. (*P. hians* Ell. Sk. Bot. S. C. and Ga. 1: 118. 1817.) A smooth, slender, usually erect pale-green perennial 2-5 dm. (8'-20') high, with narrow, flat leaves and simple, open panicles 6-15 cm. (2½'-6') long. Leaves 7-20 cm. (3'-8') long, 2-6 mm. (1"-3") wide, usually pilose near the base, margins minutely scabrous, apex very acute. Spikelets (*a, b, c*) smooth, about 2 mm. (1") long, the first glume 3-nerved, the second and third 5-nerved; palea of the third glume inflated, rigid as long as the glume and apiculate; fourth glume narrowly-ovate, apiculate. The flowering glume is shown by (*d, e*).—Moist pine barrens and marshes, North Carolina to Florida, Missouri, Indian Territory, and Texas. March to October.

Of no recognized agricultural value.

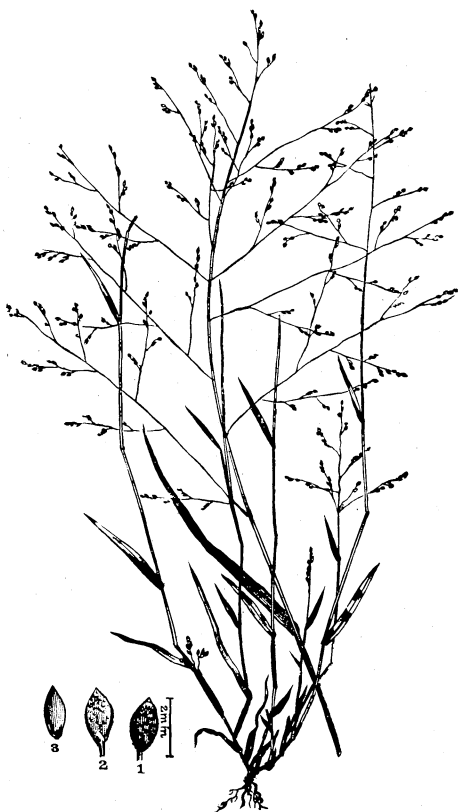


FIG. 49. **PANICUM VERRUCOSUM** Muhl. Gram. 113. 1817. **WARTY PANIC-GRASS**.—A slender, branching perennial, 3-9 dm. (1°-3°) high, with flat leaves and few-flowered spreading panicles 7.5-20 cm. (3'-8') long. Spikelets (1, 2) acute, about 2 mm. (1") long, with the second and third glumes strongly tuberculate-roughened, or verrucose, the fourth or flowering glume (3) abruptly sharp pointed, smooth.—Low, rich woodlands, mostly near the coast, New England to Florida, westward to Tennessee and Louisiana. May to October. Of no recognized agricultural value.

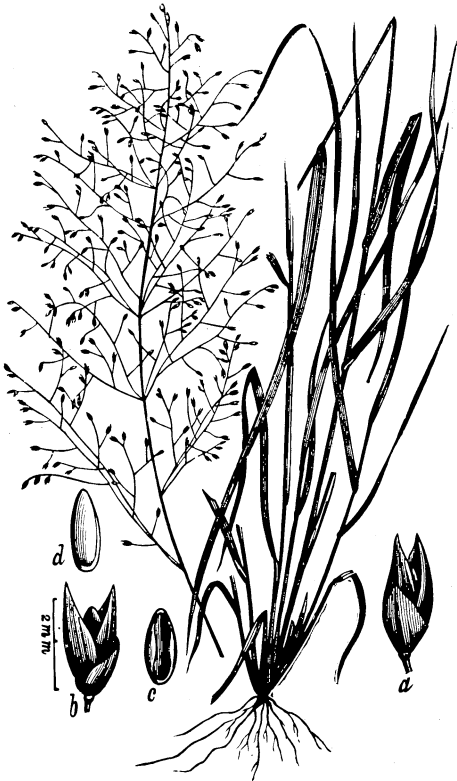


FIG. 50. **PANICUM FILIPES** Scribn. in Heller, Contr. Herb. Frankl. and Marsh. Col. 1 : 13. 1895.—A slender, more or less branching and leafy, glaucous annual (?) 3–7 dm. (12'–28') high, with rather long, flat leaves and diffuse, capillary panicles 15–30 cm. (6'–12') long. Spikelets (a, b) ovate, acute, 2.5 mm. ($1\frac{1}{4}$ ") long, the second and third glumes much exceeding the obtuse fourth glume (d). Related to *Panicum hallii*.—Dry grounds, western Texas and (?) Mexico. May to July.

Probably of little agricultural value.



FIG. 51. **PANICUM PROLIFERUM** Lam. Encycl. 4: 747a. 1797. SPROUT-
ING CRAB-GRASS.—A smooth and usually much-branched, native annual,
with rather coarse, spreading, or ascending stems 6-18 dm. (2°-6°) long, flat
leaves and diffuse terminal and lateral panicles 12-40 cm. (4'-16') long. Spike-
lets (a, b, c) ovate-lanceolate, acute 2-3 mm. (1"-1½") long, glabrous; flowering
glume (d, e) subacute, a little shorter than the 5-7-nerved third glume; first
glume usually broadly-obtuse.—Low ground, ditches, etc., Maine to Illinois and
Nebraska, south to Florida and Texas. (Cuba.) March to October.

In the South, this grass is often abundant in cultivated fields, growing with
common Crab-grass, and thus sometimes forms no inconsiderable part of the
so-called "Poor man's hay."

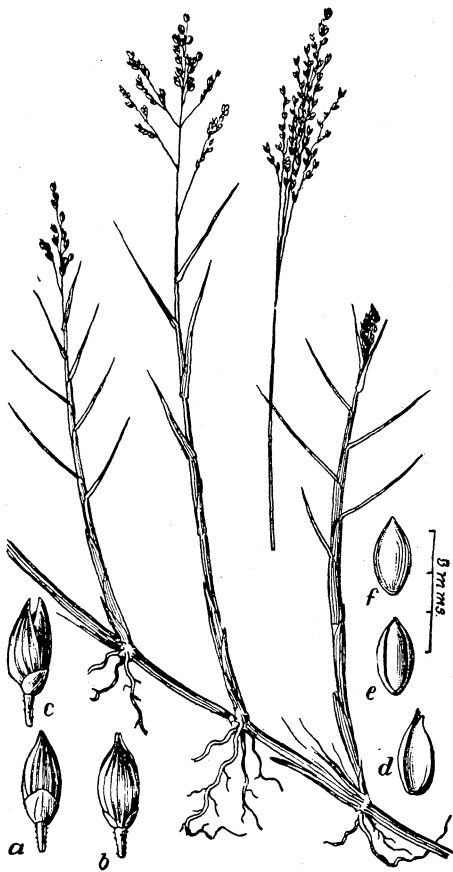


FIG. 52. **PANICUM 'REPENS** L. Sp. Pl. ed. 2: 87. 1762. CREEPING PANIC.—An extensively creeping, maritime grass 2-5 dm. (8'-20') high, with stiff leaves and rigid, upright, flowering stems or branches, and more or less open panicles 6-10 cm. (2½'-4') long. Spikelets (a, b, c) glabrous, ovate, acute, 2.5 mm. (1¼") long; first glume broad and obtuse; the second and third glumes acute, 7-nerved, and slightly exceeding the fourth- or flowering glume (f). A form with shorter and rather broader leaves and with the panicles densely flowered is the variety *CONFERTUM* Vasey (*P. gouini* Fournier).—Sea beaches, southern Alabama to Louisiana. (Tropical and subtropical coasts of both hemispheres.) A good sand-binder.

This grass is abundant on the sandy islands lying off the Gulf coast, especially on the outsides of the dunes, protecting them from the action of the winds and waves.



FIG. 53. **PANICUM ANCEPS** Michx. Fl. Bor. Am. 1: 48. 1803 (*P. rostratum* Muhl. in Willd. Enum. 1032. 1809). BEAKED PANIC.—A rather stout perennial, with flattened stems 6-12 dm. (2° - 4°) high, long leaves, glabrous or pilose, compressed sheaths, and spreading panicles. Spikelets (b, d) lanceolate, acuminate, curved, 3 mm. ($1\frac{1}{4}$ ") long, on short, scabrous pedicels; the acute second and third glumes about one-fourth longer than the elliptical-oblong flowering glume (c), which usually bears a minute tuft of hairs at the obtuse apex.—Low woods and thickets, marshes and banks of streams, Pennsylvania to Illinois, Missouri, Indian Territory, Texas, and Florida. July to October.

In luxuriant forms the panicle is often 6 dm. (2°) long, with widely spreading branches. In variety *PUBESCENS* Vasey, Contr. U. S. Nat. Herb. 3: 35. 1892, the panicle branches are more slender and the lower leaves and sheaths pubescent. Variety *ANGUSTA* Vasey, l. c., has villous lower sheaths and very long, erect, rigid leaves. Variety *DENSIFLORA* Vasey, l. c., has broader leaves and narrow densely flowered, glomerate or interrupted panicles.



FIG. 54. **PANICUM VIRGATUM** L. Sp. Pl. 59. 1753. SWITCH-GRASS.—A stout, erect perennial 9-15 dm. (30° - 50°) high, usually forming large tufts, with strong, creeping rootstocks, long, flat leaves, and ample, spreading panicles 15-50 cm. (6'-20') long. Spikelets (a, b) ovate, acuminate, 4-5 mm. ($2''$ - $3\frac{1}{4}''$) long; outer glumes acuminate, the first one-half to two-thirds as long as the spikelet, the second and third glumes (b) a little longer than the fourth or flowering glume (c).—Sandy soil, usually along streams and about ponds and lakes, Maine and Ontario to North Dakota, Colorado, Arizona, Texas, and Florida. (Mexico.) July to October.

In luxuriant forms the panicle is very diffuse and 6 dm. (2°) or more in length. In variety *CONFERTA* Vasey, Contr. U. S. Nat. Herb. 3: 36 1892, which occurs along the Atlantic coast, the panicle is narrow and densely flowered. Forms occur with spikelets containing two perfect flowers, and in Texas there is a form with much elongated panicles with the spikelets strictly 1-flowered or imperfect.

This grass is a good sand-binder and on good lands it yields a large amount of hay of fairly good quality.



FIG. 55. **PANICUM AMARUM** Ell. Sk. Bot. S.C. and Ga. 1: 121. 1817. BITTER PANIC-GRASS.—A stout, glaucous perennial 3-12 dm. (1° - 4°) high, from strong, creeping rootstocks, with rather long, rigid leaves, and many flowered, open panicles 20-60 cm. (8'-24') long. Ligule a ring of hairs; leaves 30-40 cm. (12'-16') long. Panicle branches erect or ascending, the lower sometimes 20 cm. (8') long. Spikelets (c) 5-6 mm. ($2\frac{1}{8}$ "-3") long, outer glumes acuminate, the first one-half to two-thirds as long as the second. The shorter and obtuse flowering glume and palea inclosing the perfect flower are shown at d and e.—Sandy beaches, coast of southern New England to southern Florida. July to November. In var. *MINOR* Vasey and Scribn. U. S. Dept. Agr., Div. Bot. Bul. 8: 38, 1889 (shown in a), the more slender culms are more leafy, leaves shorter, and the shorter panicle-branches appressed.

Bitter panic is a good sand-binder, and along our Southern coasts it can be utilized for binding the drifting sands.



FIG. 56. **PANICUM BULBOSUM** H. B. K. Nov. Gen. et Sp. Pl. 1 : 99. 1815. **ALKALI SACCATON**.—A stout, glabrous perennial 9–15 dm. (3° – 5°) high, from a bulbous base, with flat leaves and usually ample panicles 20–40 cm. (8'–16') long. Branches scattered, verticillate. Spikelets (*a*) 3 mm. ($1\frac{1}{4}$ ") long, smooth, obtuse, or acute; lower glume nearly one-half as long as the spikelet, broad, 3-nerved, acute; second and third glumes equal, 5-nerved, the third subtending a staminate flower; flowering glume as long as the outer ones, obtuse. A small form about 6 dm. (2°) high, with much reduced panicles, is var. **MINOR** Vasey, U. S. Dept. Agr. Div. Bot. Bul. 8 : 38. 1889.—In canyons, Texas to Arizona. (Mexico.) June to September.

A valuable and productive hay grass for alkaline soils.



FIG. 57. **PANICUM SPHÆROCARPON** Ell. Sk. Bot. S. C. and Ga. 1: 125. 1817. ROUND-FLOWERED PANIC.—A tufted, erect, or ascending and finally much-branched perennial 20-60 cm. (8'-24') high, with rather broad, thick, glabrous, nearly erect, acute, many-nerved leaves; diffuse, many-flowered panicles 5-9 cm. (2'-3½') long and nearly spherical, minutely pubescent spikelets (a, b) 1.5-2 mm. (¼"-1") long. Ligule entirely wanting.—Dry or moist woods and fields, Maine to southern Ontario, Wisconsin, Indian Territory, Texas, and Florida. (Mexico and Guatemala.) May to October.

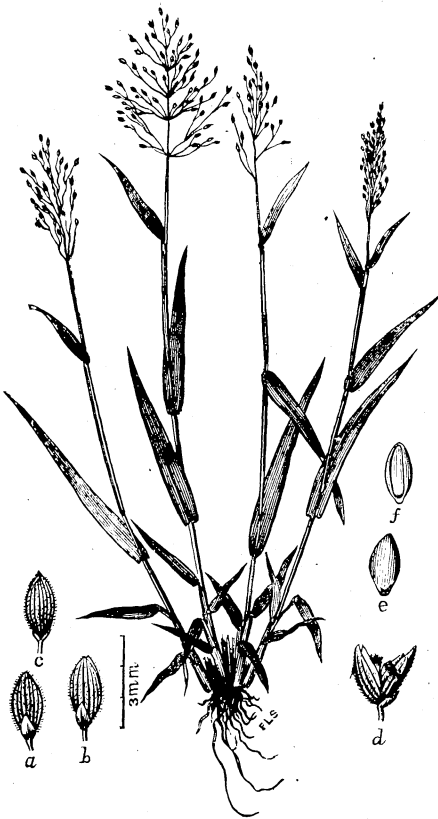


FIG. 58. **PANICUM BOREALE** Nash, Bul. Torr. Bot. Club, 22: 421. 1895. **NORTHERN PANIC-GRASS**.—An erect, finally branching perennial 3-6 dm. (1'-2') high, with lanceolate, pale-green, glabrous leaves and open, spreading panicles 4-8 cm. ($1\frac{1}{4}$ "- $3\frac{1}{4}$ " long. Nodes with a few scattered hairs. Ligule a short fringe of hairs. Spikelets (a, b, c, d) elliptical, oblong, obtuse, about 2.5 mm. ($1\frac{1}{4}$ " long, with the second and third glumes pubescent; flowering glume (e) smooth and shining, obtuse.—Damp soil, Newfoundland and Ontario to Maine, Connecticut, New York, and Minnesota. June to August.



FIG. 59. **PANICUM BARBULATUM** Michx. Fl. Bor. Am. 1:49. 1803.
BEARDED-JOINT.—Culms 3-12 dm. (1° - 4°) high, finally much-branched, slender, smooth, except the nodes, which are conspicuously bearded with reflexed, white hairs. Panicle ovate-pyramidal, 5-10 cm. ($2'$ - $4'$) long; leaves of the primary stem 8-12 cm. ($3'$ - $5'$) long, 1 cm. ($5''$) wide, those of the branches very numerous, 1-2 cm. ($\frac{1}{2}$ '- $1'$) long, 2-5 mm. ($1''$ - $2\frac{1}{2}''$) wide. Spikelets (*a, b, c, d*) numerous, glabrous, about 1.5 mm. ($5''$) long.—Bogs, wet meadows, and low woodlands, southern New York and New England to Illinois, Florida, and New Mexico.



FIG. 60. **PANICUM COLUMBIANUM** Scribn. U. S. Dept. Agr. Div. Agros. Bul. 7 : 78, fig. 60. 1897. **AMERICAN PANIC-GRASS**.—A slender, erect, finally much-branched perennial with firm, short, lanceolate, ascending, acute leaves, and small-flowered, diffuse, oblong or subpyramidal panicles. Culms puberulent; sheaths and lower surface of the leaves clothed with a dense, short, pubescence; leaf-blades 3–5 cm. (1'–2') long with cartilaginous and serrulate margins. Spikelets (a, b, c) 1.5–1.8 mm. ($\frac{1}{4}$ "–nearly 1") long, broadly obovate, obtuse, the three outer glumes densely pubescent. Branches finally erect, numerous, flower-bearing. *P. psammophilum* Nash, Bul. Torr. Bot. Club, 26. 576, 1899, not Helw, is allied to and possibly identical with this species.—Dry, sandy fields, New England southward to District of Columbia. June to August.



FIG. 61. **PANICUM NASHIANUM** Scribn. U. S. Dept. Agr. Div. Agros. Bul. 7: 79, fig. 61. 1897. NASH'S PANIC-GRASS.—A slender, and finally much-branched, leafy perennial 1–3.5 dm. (4'–15') high, with flat and rather short, rigid leaves, which are ciliate on the margins toward the base and open pyramidal panicles, the flexuose branches widely spreading or reflexed. Spikelets (*a*, *b*) 2 mm. (1") long, obovate, obtuse; outer glumes glabrous, the first about one-third as long as the third, which has a small palea (*c*); fruiting glume (*d*) broadly oval, obtuse. (4029 Curtiss, 1893, and 466 Nash, 1894.) Allied to *Panicum demissum* Trin.—Low pine barrens, often in moist ground, near the coast, Virginia to Florida and Mississippi. March to October.



FIG. 62. **PANICUM STRIGOSUM** Muhl. in Ell. Sk. Bot. S. C. and Ga. 1:126. 1817. (*P. longipedunculatum* Scribn. Tenn. Agr. Exp. Sta. Bul. 7:53, fig. 61. 1894.) LONG-STALKED PANIC.—A slender, caespitose perennial 1.5-3.5 dm. (6'-15') high, with short, chiefly radical, pilose leaves and diffuse, small-flowered, long-exserted, hairy panicles. Culms branched at the base and often geniculate at the lower joints, villous, the hairiness extending to the panicle branches; sheaths densely pilose-hairy; leaves 3-10 cm. (1'-4') long, 4-8 mm. (2"-4") wide. Spikelets 1-1.5 mm. ($\frac{1}{8}$ "- $\frac{1}{4}$ ") long, ovate-elliptical, obtuse, glabrous. Spikelets much smaller than in *P. ciliatifolium* and leaves hairy on the surface.—Dry or moist pine barrens and damp woods, apparently rare, eastern Tennessee to eastern North Carolina and Florida. May to August.



FIG. 63. **PANICUM COLONUM** L. Syst. Nat., ed. 10, 870. 1759. **JUNGLE RICE** or **SHAMA MILLET**.—An erect or ascending, more or less branching annual 3-6 dm. (1° - 2°) high, with flat leaves, and five to ten densely flowered, one-sided spikes, 1-8 cm. ($\frac{1}{2}$ '-3') long, racemose along the main axis. Spikelets (*a*, *b*, *c*) about 3 mm. ($1\frac{1}{8}$ ") long with pubescent, acute or mucronate-pointed second and third glumes.—Ditches and low ground, southeastern Virginia and Tennessee to Florida, Texas, and southern California. (Widely distributed in tropical and subtropical regions of the Old World.) June to October.

The tender stems and leaves of Jungle Rice are readily eaten by stock, and in India the grain, which is produced abundantly, is an article of commerce, and is used for food.

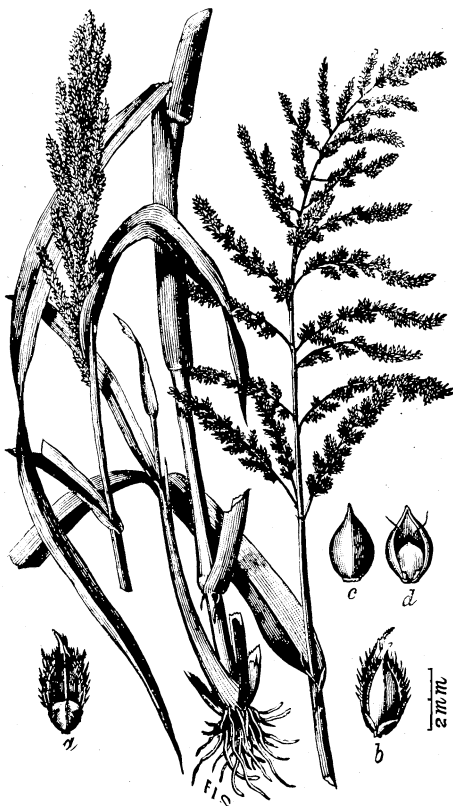


FIG. 64. **PANICUM CRUS-GALLI** L. Sp. Pl. 56. 1753. BARNYARD-GRASS.—A coarse, ascending or erect, leafy annual 3-18 dm. (1° - 6°) high, with more or less dense panicles of numerous erect or spreading spikes 5-12 cm. ($2'$ - $5'$) long. Spikelets (*a*, *b*) 2-3 mm. ($1''$ - $1\frac{1}{4}''$) long, densely and irregularly crowded in three or four rows along one side of the axis; first glume one-fourth to one-half as long as the third; second and third glumes pubescent or muricate-hispid along the nerves, the second awnless or short-awned, the third awnless or with a long rigid awn. The awnless form has been called var. **MUTICUM** Vasey, Contr. U. S. Nat. Herb. 3: 37. 1892. The species is longer-awned than the plant here figured.—Almost everywhere in the United States in barnyards, waste ground, and river banks. (Throughout the warmer regions of both hemispheres.) Flowers all summer.

Of some value in the South, where by its spontaneous growth it often yields a fair hay crop. The form shown in the illustration is one of the several varieties that grows in the Southwest and in Mexico, the grain of which is used as food by the Indians.



FIG. 65. **CHÆTOCHLOA VIRIDIS** (L.) Scribn. U. S. Dept. Agr. Div. Agros. Bul. 4: 39. 1897. (*Panicum viride* L. Sp. Pl. ed. 2, 83. 1769; *Setaria viridis* Beauv. Agrost. 51. 1812.)—An erect, glabrous, caespitose annual, 2-9 dm. ($\frac{1}{3}$ °-3°) high, with short, lanceolate leaves and dense, cylindrical, spike-like green panicles 2-10 cm. (1'-4') long. Culms usually much branched at the base, glabrous; nodes smooth; leaf-blades 0.5-2.5 dm. (2'-10') long, 4-10 mm. (2''-5'') wide, long-acuminate, slightly scabrous on both sides; setæ slender, strict, spreading, antrorsely scabrous, 1-1.5 cm. (5''-7 $\frac{1}{4}$ '') long, green or rarely purplish. Spikelets (a, b, c) about 2 mm. (1'') long; second and third glumes 5-nerved, equaling the spikelet; flowering glume (d) elliptical, rounded at the apex, finely and faintly transversely wrinkled below, or only striate and pitted.—In waste places and cultivated grounds throughout North America. Naturalized from Europe. July to September.

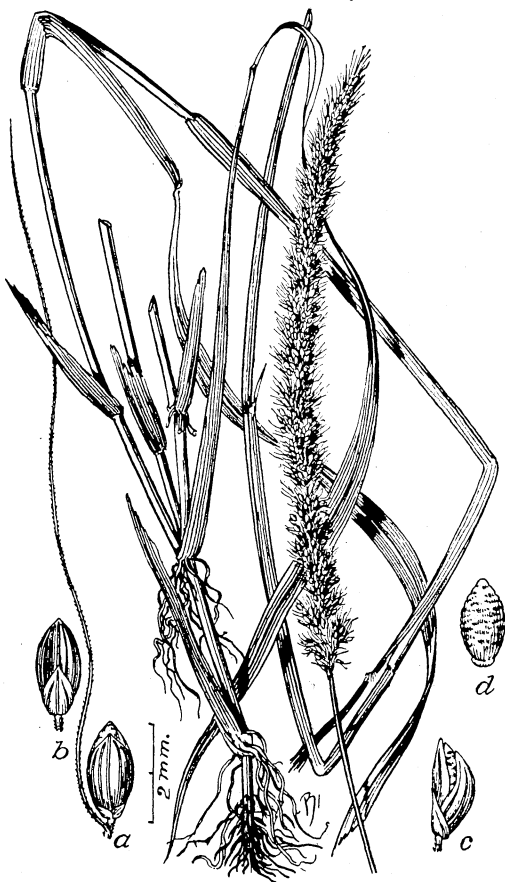


FIG. 66. **CHÆTOCHLOA CORRUGATA** (Ell.) Scribn. U. S. Dept. Agr. Div. Agros. Bul. 4:39. 1897. (*Panicum corrugatum* Ell. Sk. Bot. S. C. and Ga. 1:113. 1817; *Setaria corrugata* R. & S. Mant. 2:276. 1824.)—A rather stout, caespitose annual 6-10 dm. (2° - $3\frac{1}{2}^{\circ}$) high, with elongated spike-like panicles and linear-lanceolate, scabrous leaves. Sheaths very loose; leaf blades 1-3 dm. ($4'$ - $12'$) long, 3-6 mm. ($1\frac{1}{4}''$ - $3''$) wide. Panicles 6-16 cm. ($2\frac{1}{2}'$ - $6'$) long; rachis pilose; spikelets (a, b, c) 2 mm. ($1''$) long; second glume about four-fifths as long as the spikelet; flowering glume (d) very strongly transversely undulate-rugose throughout.—In waste places, cultivated fields, etc., Georgia to Florida.

Var. **PARVIFLORA** (Poir.) Scribn. & Merrill, U. S. Dept. Agr. Div. Agros. Bul. 21:24. 1900, is a more slender form 2-7 dm. ($8'$ - $28'$) high, much branched from the base, with shorter leaves, shorter panicles, 2-7 cm. ($1'$ - $3'$) long, and longer spreading setae.



FIG. 67. **CHÆTOCHLOA MACROSPERMA** Scribn. & Merrill, U. S. Dept. Agr. Div. Agros. Bul. 21 : 33. 1900. (*Setaria composita* of Chapm. Fl. So. U. S. and of Scribn. U. S. Dept. Agr. Div. Agros. Bul. 7 : 85, fig. 67 ed. 1 and 2, not of H. B. K.)—A very smooth, stout perennial, 6–12 dm. (2° – 4°) high, with broad, flat leaves and branching, bristly panicles 10–25 cm. (4'–10') long. Nodes smooth; sheaths glabrous; leaf blades linear-lanceolate, 1–3 dm. (4'–12') long, 10–20 mm. ($5''$ – $10''$) wide, slender-acuminate at the apex, scabrous, or sometimes nearly glabrous; rachis sparingly villous; setæ solitary, 1.5–3 cm. ($\frac{1}{2}'$ – $1\frac{1}{4}'$) long, green, antrorsely scabrous. Spikelets (a, b, c) short pedicellate, 3 mm. ($1\frac{1}{4}''$) long; second glume short-apiculate, 5 or rarely 7 nerved, third glume 5-nerved, flowering glume narrowly ovate, acute, striate, finely transversely undulate wrinkled.—Shell islands and keys, sometimes in old fields, Florida, Texas. July to October.

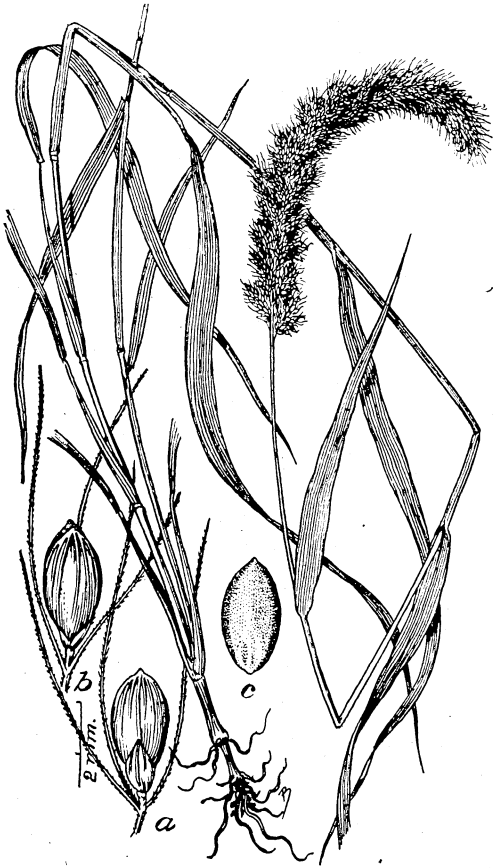


FIG. 68. **CHÆTOCHLOA ITALICA** (L.) Scribn. U. S. Dept. Agr. Div. Agros. Bul. 4: 39. 1897. (*Panicum italicum* L. Sp. Pl. 56. 1753; *Setaria italica* Beauv. Agrost. 51. 1812.) **MILLET** or **HUNGARIAN GRASS**.—A stout, erect, somewhat glaucous annual 10–24 dm. (3° – 8°) high, with broad leaves and large, dense, compound, spiciform panicles 8–20 cm. ($3'$ – $8'$) in length. Nodes bearded, with short appressed hairs; leaf blades lanceolate, narrowed at the base, long-acuminate, 2–4 dm. ($8'$ – $16'$) long, 1.5–3 cm. ($\frac{1}{4}$ '– $1\frac{1}{4}'$) wide, scabrous. Panicles dense, cylindrical 2–3 cm. ($1'$ – $1\frac{1}{4}'$) in diameter; rachis densely villous; setæ 1 to 3, green or purplish, antrorsely scabrous. Spikelets (*a*, *b*) elliptical, strongly convex, 2.5–3 mm. ($1\frac{1}{4}''$ – $1\frac{3}{4}''$) long, obtuse; second and third glumes about equaling the flowering glume, 5 to 7 nerved; flowering glume (*c*) glossy, nearly smooth.—Widely cultivated and often an escape in fields and waste places; very variable. Quebec to Minnesota, south to Florida and Texas. Native of Europe and Asia. July to September.

In var. **GERMANICA** (Mill.) Scribn. l. c. the plant is much smaller, 3–9 dm. (1° – 3°) high, with narrower panicles, about 1 cm. ($\frac{1}{4}'$) in diameter, and long, usually purple setæ, some forms approaching *Chætochloa viridis*.

A very valuable forage and soiling plant, widely cultivated in most parts of the world.



FIG. 69. **CENCHRUS TRIBULOIDES** L. Sp. Pl. 1050. 1753. SAND BUR.—An annual with spreading or ascending, much branched, compressed culms about 3 dm. (1^o) high, and terminal spikes of 6-20 burs inclosing the spikelets. Burs (a) nearly globose and covered with strong and more or less pubescent, barbed spines, becoming very hard at maturity, inclosing two spikelets. Spikelets (c) two-flowered, about 6 mm. (3") long; glumes thin, membranaceous.—Sandy fields, waste grounds, river banks, and sea beaches. Maine and Ontario to South Dakota and Colorado, south to Florida and southern California. (Mexico and South America.) June to October.

One of the worst of annual weeds wherever it becomes abundant.



FIG. 70. **CENCHRUS MYOSUROIDES** H. B. K. Nov. Gen. et Sp. Pl. 1 : 115. t. 35. 1815. (*Panicum cenchroides* Ell. Bot. S. C. and Gd. 1 : 111. 1817.) A stout perennial 6-15 dm. (2° - 5°) high, more or less branching and geniculate below, with glabrous sheaths, flat leaves, and densely many-flowered spikes 5-20 cm. ($2'$ - $8'$) long. Spikelets about 5 mm. ($2\frac{1}{4}''$) long, equaling the bristles of the surrounding involucre (see *a* and *b*); first glume acute, about one-half as long as the spikelet; second and third glumes 5-nerved, the latter as long as the chartaceous fourth glume.—Waste grounds, southern Florida, Georgia, to Texas. (Mexico, South America.) August to January.



FIG. 71. **PENNISETUM SETOSUM** (Sw.) Rich. in Pers. Syn. 1 : 72. 1805. (*Cenchrus setosus* Sw. Fl. Ind. Occ. 1 : 26. 1797.)—A stout, branching perennial 9–12 dm. (3° – 4°) high, with flat, glabrous leaves and dense, bristly, cylindrical spikes 10–15 cm. ($4'$ – $7'$) long. Sheaths loose, striate; leaf blades broadly-linear, glabrous. Involucres (a) sessile, several of the bristles more than twice as long as the single spikelet (b); first glume small, the second and third equaling the flowering glume (c).—Southern Florida. (Widely distributed in tropical countries.) September.

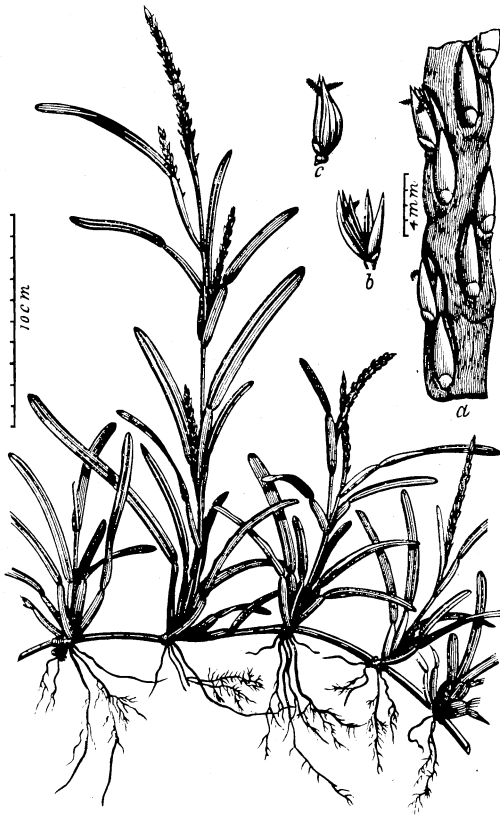


FIG. 72. **STENOTAPHRUM SECUNDATUM** (Walt.) Kuntze, Rev. Gen Pl. 2: 794. 1891. (*Ischæmum secundatum* Walt. Fl. Car. 249. 1788; *Stenotaphrum americanum* Schrank. Fl. Monac. t. 98. 1811-1818.) ST. AUGUSTINE or MISSION-GRASS.—An extensively creeping perennial, with hard, flat culms, rather broad leaves and upright flowering stems 1.5-3 dm. (6'-12') high. Spikes 5-12 cm. (2'-5') long, terminal and lateral; spikelets (*b*, *c*) 2 to 3 together in the alternate notches of the flattened rachis (*a*) sessile, acute or acuminate, about 4 mm. (2'') long.—Muddy or moist sandy shores and marshes along the coast, South Carolina to Florida and Louisiana, west to Texas. (Widely distributed in tropical America and the Pacific islands.) April to October.

St. Augustine grass is common along the Atlantic coast as far north as South Carolina, and is extensively used for lawns in Charleston, Jacksonville, etc. It is propagated by cuttings or sets, and quickly covers the most sandy yards with a dense, carpet-like growth. In Australia it is called Buffalo grass and in Jamaica it is known as Pimento-grass.



FIG. 73. **LUZIOLA ALABAMENSIS** Chapm. Fl. So. U.S. 584. 1860. CREEPING WATER-GRASS.—An aquatic, stoloniferous grass, the upright culms 0.5–1.5 dm. (2'–6') high, rooting at the lower joints, with long, narrow leaves, the lower much exceeding the culm; the staminate and pistillate spikelets in separate panicles 2–7 cm. (1'–3') long; glumes of the pistillate spikelets (a) 11–13-nerved, twice the length of smooth grain (d); glumes of the staminate spikelet (b) lanceolate, 7-nerved.—In springy places and rivulets in the pine barrens, southern Alabama. (Cuba.) June to October.



FIG. 74. **HOMALOCENCHRUS LENTICULARIS** (Michx.) Kuntze, Rev. Gen. Pl. 2: 777. 1891. (*Leersia lenticularis* Michx. Fl. Bor. Am. 1: 39. 1803.) CATCH-FLY-GRASS.—A rather stout, branching perennial 6–12 dm. (2° – 4°) high, with broad and widely spreading leaves and diffuse panicles, 10–20 cm. (4'–8') long. Spikelets broadly oval, 4–5 mm. ($2''$ – $2\frac{1}{2}''$) long and nearly as broad, closely imbricate (as shown at *a*), the glume and palea strongly bristly-ciliate along the keels.—Marshes and wet thickets, near the coast, Virginia to Texas, and in the Mississippi Valley from southern Illinois and Missouri to Louisiana. August, to September.

Of no agricultural value.



FIG. 75. **HOMALOCENCHRUS HEXANDRUS** (Sw.) Kuntze, Rev. Gen. Pl. 2 : 777. 1891. (*Leersia hexandra* Sw. Prod. Veg. Ind. Occ. 21. 1788.)—A rather slender, usually erect, branching grass 6–12 dm. (2° – 4°) high, with narrow, many-flowered, erect panicles 10–15 cm. (4'–6') long. Spikelets (*a*, *b*) about 2 mm. (1") long, acute, keels of the glumes strongly hispid and the margin of the first glume fringed with short bristles. Stamens six.—In swamps and ditches near the coast, North Carolina to Florida and Texas. (In all tropical and many subtropical countries.) May to September.



FIG. 76. **HOMALOCENCHRUS ORYZOIDES** (Linn.) Poll. Hist. Pl. Palat. 1: 52. 1776. (*Phalaris oryzoides* L. Sp. Pl. 55. 1753; *Leersia oryzoides* Sw. Fl. Ind. Occ. 1: 132. 1797.) **RICE CUT-GRASS**.—A rather stout, rough, and much-branched perennial 6–12 dm. (2° – 4°) high, with open, pale-green or straw-colored panicles 12–25 cm. (5'–10') long. Spikelets (b, c) 4–5 mm. ($2''$ – $2\frac{1}{4}''$) long, about 1.5 mm. ($\frac{3}{8}''$) broad, loosely imbricated (a), keels strongly ciliate-hispid as is also the margin of the first glume. Within the lower sheaths are found cleistogamic fruiting spikelets.—Along streams and ditches and in marshes, usually in the open. Nova Scotia and Ontario to Washington, Florida, and Texas. (Europe and Asia.) August to October.



FIG. 77. **HOMALOCENCHRUS VIRGINICUS** (Willd.) Britton, Trans. N. Y. Acad. Sci. 9: 14. 1889. (*Leersia virginica*, Willd. Sp. Pl. 1: 325. 1797.) **WHITE-GRASS**.—A slender, erect, or ascending, usually much-branched, perennial 6-12 dm. (2° - 4°) high, with narrow leaves and simple panicles 8-12 cm. (3'-5') long. Spikelets (b) closely imbricated as shown by (a), 3-4 mm. ($1\frac{1}{4}$ "-2") long; glume very abruptly short-pointed, ciliate on the keel and with a few, short, stiff hairs on the sides or nearly smooth.—Moist thickets and low woods, usually along streams. Maine and Ontario to South Dakota, southward to Florida and Texas. May to October.



FIG. 78. **HOMALOCENCHRUS MONANDRUS** (Sw.) Kuntze, Rev. Gen. Pl. 2: 777. 1891. (*Leersia monandra* Sw. Prod. Veg. Ind. Occ. 21. 1788.) **SLENDER CUT-GRASS**.—A slender, sparingly branched grass with somewhat wiry culms 3-6 dm. (1°-2°) high, and usually glaucous leaves; panicle small, branches alternate, distant, flowering above, naked below. Spikelets (*b, c*) pale, semi-ovate; about 1.5 mm. ($\frac{3}{8}$ " long, smooth; stamen, 1.—Keys of southern Florida (in coral soil) and in southern Texas. (Mexico, West Indies, and South America.) February to May.



FIG. 79. **PHALARIS AMETHYSTINA** Trin. Phalarideæ, 56. 1839. PURPLE CANARY-GRASS.—A stout annual 6-12 dm. (2°-4°) high, with broad, flat leaves, and ovoid or oblong, densely-flowered terminal panicles 2-5 cm. (1'-2') long, usually purplish. Spikelets (a) 6-7 mm. (3"-3½") long; outer glumes straight, acute, the inner ones (shown in b) hairy and more than one-half as long as the flowering glume, which is also hairy.—Oregon to California and southward to Chile. June.



FIG. 80. **PHALARIS CAROLINIANA** Walt. Fl. Car. 74. 1788. (*P. intermedia* Bosc. in Lam. Encycl. Suppl. 1 : 300. 1810.) SOUTHERN CANARY-GRASS.—A comparatively slender species 3-10 dm. (1° - $3\frac{1}{4}^{\circ}$) high, with rather short, flat leaves 5-15 cm. (2'-6') long, and ovoid, densely flowered, capitate panicles 2-5 cm. (1'-2') long. Spikelets (*a*, *b*) 5 mm. ($2\frac{1}{4}$ ") long; outer glumes strongly winged-keeled, acute, one-third to one-fourth longer than the fertile floret; second pair of glumes linear, hairy, about one-half the length of the pubescent flowering glume (*c*, *d*).—River bottoms and wet places, South Carolina to Indian Territory, Texas, Nevada, California, and Oregon. April.



FIG. 81. **PHALARIS ANGUSTA** Nees, Agrost. Bras. 391. 1829. (*P. intermedia angusta* Chapm. Fl. So. U. S. 568. 1860.) CALIFORNIA TIMOTHY.—A stout grass 6–14 dm. (2° – $4\frac{1}{2}^{\circ}$) high, with narrow, densely flowered, spike-like panicles 5–12 cm. ($2'$ – $5'$) long. Spikelets (a) 4 mm. ($2''$) long; outer glumes winged on the keel, abruptly acute; second pair of glumes linear, one-third as long as the thinly pilose flowering glume (b).—In wet places, South Carolina and Louisiana to southern California. (South America.) May.

Cultivated to a limited extent in the Southern States, and regarded by some as an excellent grass for winter and spring grazing, but in California it is not deemed of any agricultural value.

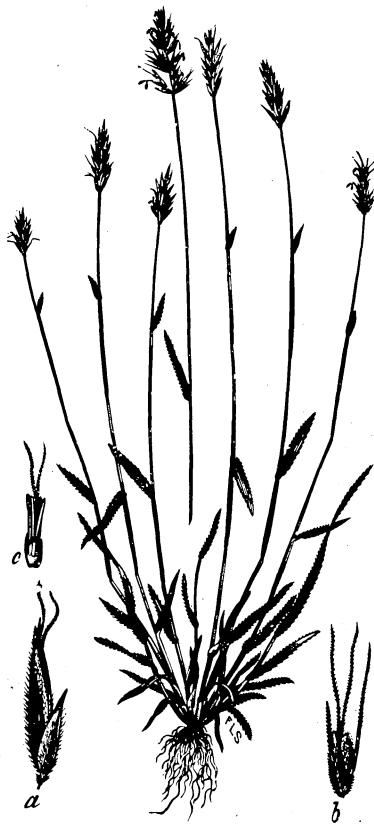


FIG. 82. **ANTHOXANTHUM ODORATUM** L. Sp. Pl. 28. 1753. SWEET VERNAL-GRASS.—A sweet-scented grass, with slender, erect, tufted culms, flat leaf-blades, and narrow, spike-like terminal panicles 2-10 cm. ($\frac{3}{4}$ '-4') long. Spikelets (a) 6-8 mm. ($3''$ -4'') long, the very unequal outer glumes inclosing the 2-lobed and awned inner pair (b), which exceed the broadly truncate and short flowering glume (c).—Abundantly naturalized in lawns, fields, and waysides from Newfoundland and Ontario to North Carolina and Tennessee. (Europe, north-western Asia, and northern Africa.) May to September.

A sweet-scented grass of little agricultural value. In New Zealand it is regarded a weed. The slender stems have been used in the manufacture of imitation Leghorn hats.

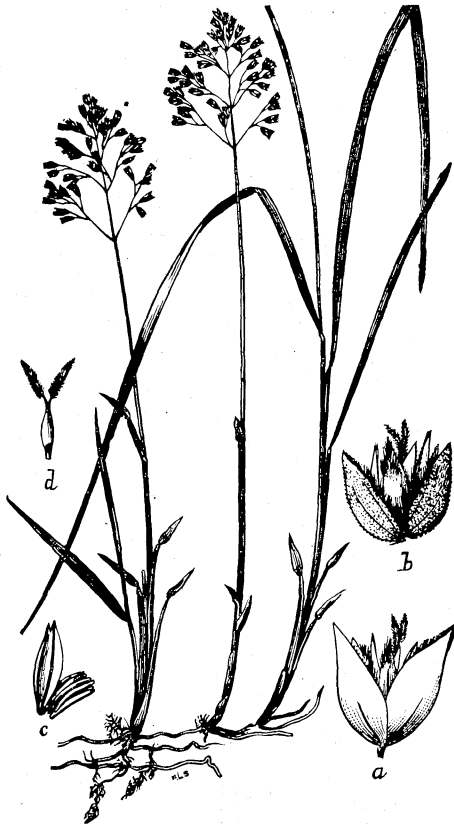


FIG. 83. **SAVASTANA ODORATA** (L.) Scribn. Mem. Torr. Bot. Club, 5: 34. 1894. (*Holcus odoratus* L. Sp. Pl. 1048. 1753; *Heirochloë borealis* R. & S. Syst. 2: 513. 1817.) **VANILLA-GRASS**.—A slender, sweet-scented, stoloniferous perennial, 3–6 dm. (1°–2°) high, with short culm-leaves and brownish, open panicles 4–10 cm. (1½'–4') long, branches in pairs. Spikelets (a) yellowish-brown and purple, 4–6 mm. (2"–3") long; first and second glumes thin, subequal, glabrous; the third and fourth hairy and awn-pointed, the fifth hairy at the apex and inclosing a perfect flower. At b is shown a spikelet with the first pair of glumes removed; c, the palea with three stamens; d, pistil. The flat leaves of the sterile shoots are 1–3 dm. (4'–12') long.—Newfoundland and New Brunswick to southern New York, west to Minnesota and Iowa; in the Rockies from British America south to Arizona and Mexico; Alaska southward in the mountains to Oregon. (Cooler temperate regions and high mountains of both hemispheres.) April to August.

This grass is remarkable for its fragrance, the odor resembling that of sweet vernal-grass, but more powerful. The long leaves are woven into small mats and boxes that find a ready market on account of their sweet odor.



FIG. 84. **SAVASTANA MACROPHYLLA** (Thurb.) Beal, Grasses N. A. 2: 187. 1896. (*Hierochloë macrophylla* Thurb. in Boland. Trans. Calif. Agr. Soc. 1864-65: 65. 1866.) **VANILLA-GRASS**.—A rather stout perennial 6-10 dm. (2° - $3\frac{1}{2}^{\circ}$) high, with long and broad leaves and loosely flowered panicles 8-12 cm. ($3'$ - $5'$) long. Spikelets (*a*) 5 mm. ($2\frac{1}{4}''$) long; outer glumes obtuse, those of the staminate flowers fringed on the margins and notched at the broad apex, often with a slight awn between the lobes; glume of the perfect flower pubescent toward the apex. A spikelet with the outer pair of glumes removed is shown at *b* and the pistil is illustrated by *c*. Leaves 30-40 cm. ($12'$ - $18'$) long and 8-16 mm. ($4''$ - $8''$) wide.—Coniferous woods, California and Oregon. March to May.



FIG. 85. **ARISTIDA STRICTA** Michx. Fl. Bor. Am. 1: 41. 1803. WIRE-GRASS.—A rigid, erect, wiry perennial 6-12 dm. (2° - 4°) high, with narrow, involute leaves and strict, spike-like, slender panicles about 30 cm. (12') long, its branches erect. Empty glumes slightly unequal, the second one 10-12 mm. ($5''$ - $6''$) long, rather longer than the lower, both awn-pointed. Awns of the flowering glume nearly equal, 10-12 mm. ($5''$ - $6''$) long, all divergent or reflexed when mature. Leaves pilose on the upper or inner surface, becoming lanate at the base, with long, white hairs. A spikelet is shown at *a*, the flowering glume with its very short palea at *b*, and two anthers at *c*.—Dry pine barrens near the coast, Virginia and North Carolina to Florida and Mississippi, often covering extensive tracts and forming the bulk of the pasturage. July to October.

A grass of considerable economic value.



FIG. 86. **ARISTIDA PALUSTRIS** (Chapm.) Vasey, Desc. Cat. Gr. U. S. 35. 1885. (*A. virgata palustris* Chapm. Fl. So. U. S. 555. 1860.) SWAMP POVERTY-GRASS.—An upright, rigid perennial 6–15 dm. (2° – 5°) high, with long, narrow leaves and slender, interrupted, spicate panicles 30–70 cm. ($12'$ – $30'$) long. Leaves flat below, becoming involute, 3–6 dm. (1° – 2°) long. Empty glumes (a) subequal, 10–12 mm. ($5''$ – $6''$) long, the first 3-nerved, the second 1-nerved; flowering glume (b) about 8 mm. ($4''$) long; lateral awns about 16 mm. ($8''$) long, the divergent middle one 20–25 mm. ($10''$ – $12''$) long. Palea very short.—Moist places near the coast in the pine barrens, South Carolina to Texas. (Cuba.) August to October.



FIG. 87. **ARISTIDA LANOSA** Muhl. Gram. 174. 1817. (*Aristida gossypina* Bosc. in Beauv. Agrost. 30. 1812, nomen; *A. lanata* Poir. in Lam. Encycl. Suppl. 1: 453. 1810. Not Forsk. 1775.) **WOOLLY POVERTY-GRASS**.—A rather stout perennial, with simple stems 6–12 dm. (20° – 40°) high, and narrow panicles 30–60 cm. (12'–24') long, nodding, rather loosely flowered, the unequal lower branches 2–5 cm. (1'–2') long. Leaves flat, 3–6 dm. (1° – 2°) long; sheaths, at least the lower ones, woolly. Empty glumes unequal, the first 14–16 mm. (7''–8'') long, the second 8–10 mm. (4''–5'') long, both 1-nerved; flowering glume (b) spotted, about 10 mm. (5'') long, the lateral awns 10 mm. (5'') long, the divergent middle awn about 18 mm. (9'') long.—Dry pine barrens, mostly near the coast, Delaware to Texas and Indian Territory. September to November.



FIG. 88. *ARISTIDA TUBERCULOSA* Nutt. Gen. 1 : 57. 1818. LONG-AWNED POVERTY-GRASS.—A rigid, much-branched perennial 3-4.5 dm. (12'-18') high, with nearly simple panicles 10-18 cm. (4'-7') long, branches erect, rather distant, the lower in pairs, one short and few-flowered, the other elongated and many-flowered. Empty glumes nearly equal, 24 mm. (12'') long, awn-pointed; flowering glume (b) about 20 mm. (10'') long, twisted above to the division of the awns and with a densely barbate, sharp-pointed callus; awns nearly equal, divergent or reflexed, 3-5 cm. (1¼'-2') long, distinctly articulated with the glume.—Dry, sandy soil, near the coast, Massachusetts to Mississippi; also in Illinois, Wisconsin, and Minnesota. August to October.



FIG. 89. **STIPA SPARTEA** Trin. Mém. Acad. St. Pétersb. VI. Sci. Math. Phys. et Nat. 1 : 82. 1831. PORCUPINE-GRASS.—A stout, erect perennial, with simple culms 6–10 dm. (2°–3°) high, long, narrow leaves and contracted, few-flowered panicles 10–20 cm. (4'–8') long. Spikelets (a) large; empty glumes subulate-pointed, 24–36 mm. (12"–18") long, slightly unequal; flowering glume (b) 16–20 mm. (8"–10") long, including the barbed and very sharp-pointed stipe or callus, sparsely pubescent below and crowned with a few short hairs; palea nearly as long as the glume; awn stout, 8–15 cm. (3'–6') long, twisted below and twice geniculate above.—Prairies, Illinois to Colorado, north to Manitoba and British Columbia. June to August.

A good forage plant, particularly common in the prairie region. The sharp and bearded callus of the seeds renders them dangerous to sheep, as they readily become attached to the wool and may penetrate the flesh, causing serious injury.

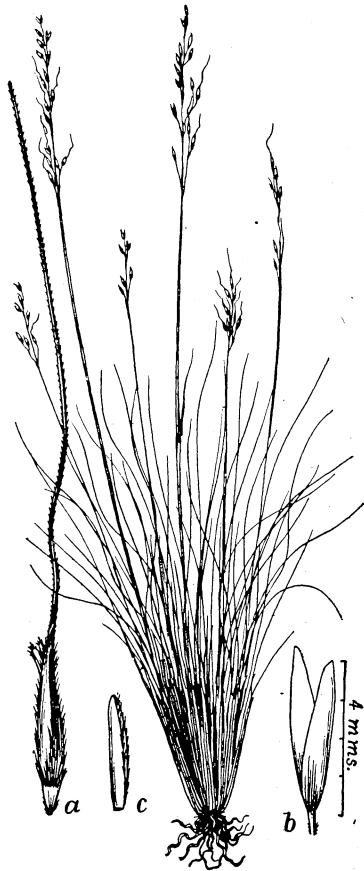


FIG. 90. **STIPA KINGII** Boland. Proc. Calif. Acad. Sci. 4: 170. 1872. (*Oryzopsis kingii* Beal, Grasses N. A. 2: 229. 1896.)—A slender, erect, caespitose perennial 2–4 dm. (8'–16') high, with involute, filiform leaves and contracted panicles 8–12 cm. (3'–5') long, the short erect branches few-flowered. Spikelets 4 mm. (2") long, the outer glumes (b) slightly unequal, obtuse, hyaline; flowering glume (a) thinly pubescent; callus hairy, short and obtuse; awn slightly twisted, about 12 mm. (6") long. Palea (c) nearly as long as the glume. Anthers bearded at the apex. Awns scabrous.—California and (?) Nevada.



FIG. 91. **STIPA MONGOLICA** Turcz. in Trin. Gram. Suppl. 42. 1836.—A slender, densely tufted perennial about 3 dm. (1^0) high, with short, setaceous leaves and loosely few-flowered, purplish panicles 7–10 cm. ($2\frac{1}{4}$ – $4'$) long; empty glumes (a) 5 mm. ($2\frac{1}{4}''$) long, equal, obtuse, smooth, subhyaline; flowering glume (b) about 4 mm. ($2''$) long, thinly hairy below and at the 2-toothed apex; callus short, obtuse; awn 12–16 mm. ($6''$ – $8''$) long, geniculate and twisted below, long-plumose-hairy. Palea nearly as long as the glume.—Mountains of Colorado. (Eastern Asia).



FIG. 92. **ORYZOPSIS MELANOCARPA** Muhl. Gram. 79. 1817. BLACK MOUNTAIN RICE.—A rather stout, long and broad-leaved perennial 3-9 dm. (1°-3°) high, with narrow, simple panicles 15-20 cm. (6'-8') long, branches spreading in flower, the lower ones in pairs and about 5 cm. (2') long, flower-bearing above, naked below. Spikelets (*a, b*) few, 8-10 mm. (4"-5") long; empty glumes about 7-nerved, acute, slightly exceeding the thinly pubescent and coriaceous flowering glume (*c*); awn about 24 mm. (12") long.—Open, rocky woods, sometimes on cliffs, Quebec and Ontario to Delaware, Kentucky, Missouri, and Minnesota.



FIG. 93. *ORYZOPSIS ASPERIFOLIA* Michx. Fl. Bor. Am. 1: 51. 1803. WHITE MOUNTAIN RICE.—A slender perennial 1.5-5 dm. (6'-20') high, with narrow, simple, few-flowered panicles 6-10 cm. (2½'-4') long. Empty glumes (a) 6-8 mm. (3"-4") long, abruptly pointed; flowering glume (b, c) nearly as long as the empty ones, thinly pilose; callus barbate, short and blunt; awn slightly twisted, 10-12 mm. (5"-6") long. The basal leaves, which are 5-7 mm. (2¼"-3¼") wide, often overtop the culm.—Woods, Newfoundland, Massachusetts, and New Jersey to Minnesota and British Columbia, and southward in the Rockies to New Mexico. April to July.

This grass is evergreen, and in the northern parts of New England, where it is known as "winter grass," it affords excellent grazing.

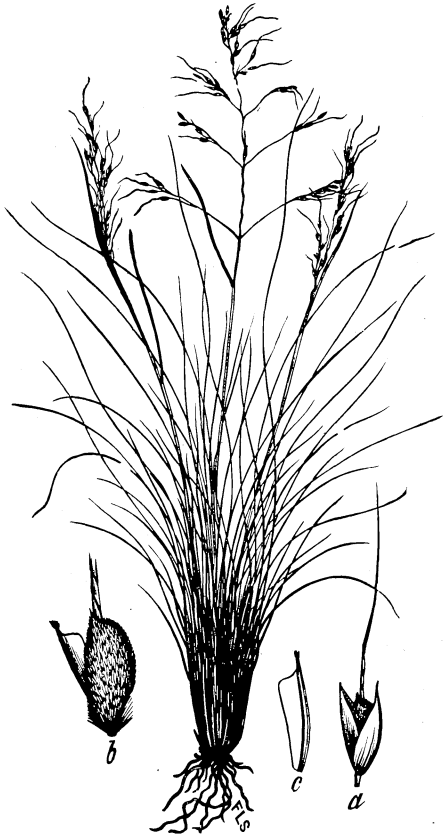


FIG. 94. **ORYZOPSIS FIMBRIATA** (H. B. K.) Hemsl. Biol. Centr. Am. Bot. 3: 538. 1885. (*Stipa fimbriata* H. B. K. Nov. Gen. et Sp. Pl. 1: 126. 1815.) A slender, tufted perennial 5-8 dm. (20'-30') high, with very narrow, involute leaves and loosely flowered panicles 10-13 cm. (4'-5') long, the lower branches in twos or threes, capillary, few-flowered. Spikelets (a) about 6 mm. (3") long, a little longer than the densely pubescent flowering glume (b); callus bearded, short, and obtuse. Palea as long as its glume. Awn 12-16 mm. long, twisted below.—In canyons and under limestone cliffs, mountains of western Texas to California. (Mexico and Lower California.) July to September.

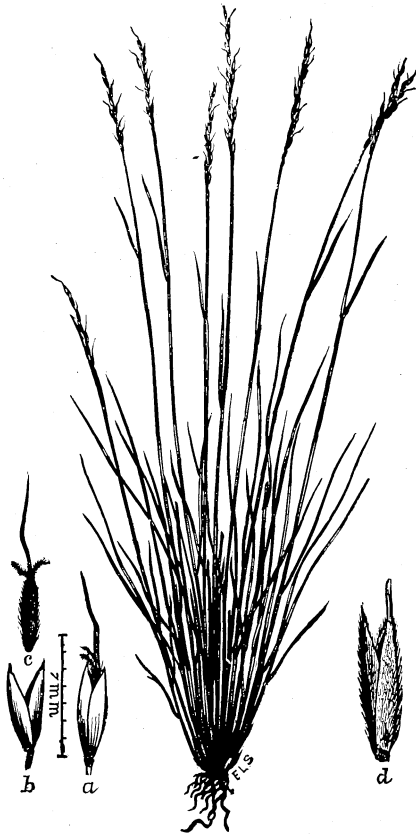


FIG. 95. *ORYZOPSIS EXIGUA* Thurb. in Wilkes U. S. Explor. Exped. 17: 481. 1874. LITTLE MOUNTAIN RICE.—A slender, native perennial 1.5–4 dm. (6'–16') high, with filiform leaves and narrow, simple, few-flowered panicles 2–6 cm. (1'–2½') long. Branches short, appressed. Empty glumes (*b*) 4–5 mm. (2''–2½'') long, nearly equal, and abruptly mucronate-pointed, a little longer than the thinly pubescent flowering glume (*c*, *d*); callus short and obtuse; awn about 4 mm. (2'') long, twisted below. Palea as long as its glume and similarly hairy.—Among rocks in canyons and on mountain tops, Montana and Wyoming to Utah, Oregon, and Washington. June to August.

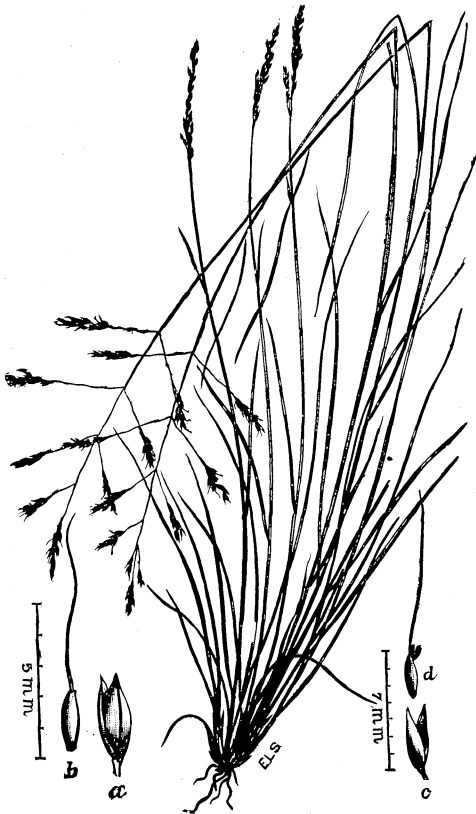


FIG. 96. **ORYZOPSIS MICRANTHA** (Trin. & Rupr.) Thurb. in Gray, Proc. Acad. Nat. Sci. Phila. 1863: 78. 1863. (*Urachne micrantha* Trin. & Rupr. Agrostidea, 3: 16. 1842.) SMALL-FLOWERED MOUNTAIN RICE.—A slender, erect perennial, usually about 6 dm. (2°) high, with narrow leaves and small-flowered open panicles 8-16 cm. (3'-6') long. Lower branches of the panicle 2-5 cm. (1'-2') long, flower-bearing above. Spikelets 2-2.5 mm. (1"-1¼") long; empty glumes (a, c) broadly ovate, acute, nearly equal, a little longer than the glabrous flowering glume (b); awn slender, 6 mm. (¾") long.—Woods, river bluffs, and mountain sides, South Dakota to Nebraska, Colorado, New Mexico, and Arizona. June to August.

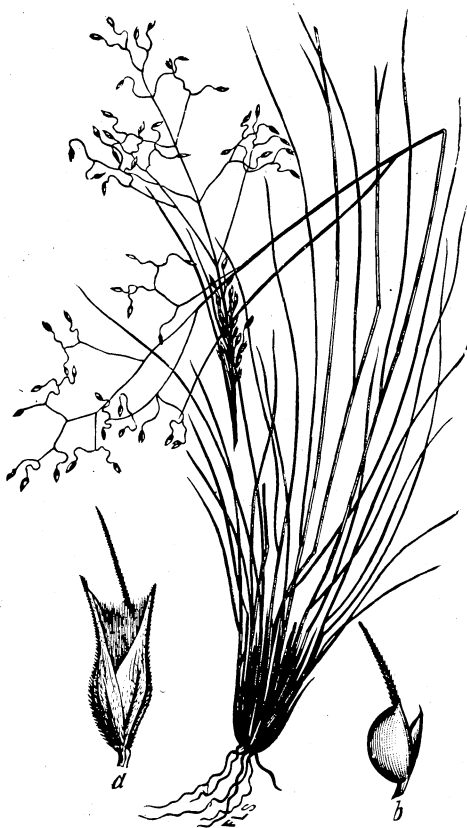


FIG. 97. **ORYZOPSIS CUSPIDATA** (Nutt.) Benth. in Vasey, U. S. Dept. Agr. Spec. Rept. 63 : 23. 1883. (*Eriocoma cuspidata* Nutt. Gen. 1 : 40. 1818; *Stipa membranacea* Pursh, Fl. Am. Sept. 2 : 728. 1814, not Linn. 1753; *Oryzopsis membranacea* Vasey, U. S. Dept. Agr. Div. Bot. Bul. 12² : 10, pl. 10. 1891.) **INDIAN MILLET.**—A native perennial, growing in bunches, 3-7 dm. (12'-28') high, with narrow, involute leaves and dichotomously branched, diffuse panicles 12-15 cm. (5'-6') long. Spikelets (a) 6-8 mm. (3"-4") long, on filiform and flexuose pedicels; empty glumes pubescent, 3-5-nerved, broad, and ventricose below, attenuate-pointed, much longer than the densely long-hairy and broadly oval flowering glume; awn about 4 mm. (2") long, readily falling off. The hairs finally fall from the flowering glume, which becomes very hard, smooth, and shiny.—Grassy slopes, dry hillsides, sandy river banks, about springs in deserts, in cultivated fields, etc., South Dakota to New Mexico, California, and British Columbia. (Mexico.) May to September.

A bunch grass which thrives in soil too dry and sandy for most other grasses, and is much esteemed in the grazing regions where it abounds. Will grow in dry "sage brush" land and is really a desert grass.



FIG. 98. **MILIUM EFFUSUM** L. Sp. Pl. 61. 1753. WILD MILLET.—A pale-green perennial, with simple culms 6-14 dm. (2°-5°) high, with broad, flat, spreading leaves and diffuse panicles 15-20 cm. (6'-8') long. Branches of the panicle two to five together, flower-bearing above, naked below. Spikelets (*a*, *b*) 3 mm. (1½") long; empty glumes nearly equal, 3-nerved, a little longer than the oblong, obtuse flowering glume (*c*).—Woods and ravines, Cape Breton Island to western Ontario, Pennsylvania, Michigan, and Minnesota. (Europe, Asia.) June, July.

A fine growing woodland grass of some agricultural value.



FIG. 99. *MUHLENBERGIA DIFFUSA* Schreb. Besch. Gras. 2: 143, pl. 51. 1810. NIMBLE WILL.—A low, slender perennial, with ascending, much-branched wiry culms 3-8 dm. (1° - $2\frac{1}{2}^{\circ}$) long, flat leaf-blades and narrow, rather densely flowered, slender panicles 5-18 cm. ($2'$ - $7'$) long. Spikelets (*b*) 2 mm. ($1''$) long; empty glumes (shown at *a*) very minute, the lower nearly obsolete, the upper truncate; awn once or twice longer than the flowering glume (*c*).—In shaded thickets, borders of woods, waste ground about dwellings, etc., Maine and Ontario to Minnesota, Kansas, Texas, and Florida. (Mexico(?).) August to January (in Louisiana).

A common and well-known grass, with slender, diffusely branching, and tough, wiry stems. It is of comparatively little agricultural value.



FIG. 100. **MUHLENBERGIA MEXICANA** (L.) Trin. Unifl. 189. 1824. (*Agrostis mexicana* L. Mant. 1: 31. 1767.) **MEXICAN DROPSEED**.—An upright or ascending, usually much-branched perennial 3-9 dm. (1° - 3°) high, with a scaly, creeping rootstock, numerous flat leaf-blades, and contracted, densely flowered panicles, its spike-like branches 2-5 cm. ($1'$ - $2'$) long. Spikelets (*a*, *b*) 2.5-3 mm. ($1''$ - $1\frac{1}{2}''$) long; empty glumes slightly unequal, lanceolate, long-acuminate-pointed, about the length of the very acute and awnless flowering glume.—Sandy or rocky banks of streams and low thickets, New Brunswick and Ontario to North Carolina, Indian Territory, and South Dakota.

Of some agricultural value as a native hay grass in low, wet meadows; by its strong creeping rhizomes it sometimes does good service in binding sandy river banks subject to wash.



FIG. 101. **MUHLENBERGIA TENUIFLORA** (Willd.) B. S. P. Prel. Cat. N. Y. 67. 1888. (*Agrostis tenuiflora* Willd. Sp. Pl. 1: 364, 1797; *Muhlenbergia willdenovii* Trin. Unif. 188. 1824.) **SLENDER-FLOWERED DROPSEED.**—An erect, simple or sparingly-branched perennial 3-9 dm. (1°-3°) high, with creeping, scaly rootstocks, flat leaf-blades and rather few-flowered linear panicles 15-30 cm. (6'-12') long, the branches appressed. Spikelets (a) 3 mm. (1½") long; empty glumes slightly unequal, acute about one-half the length of the flowering glume; callus bearded; awn slender, about 8 mm. (4") long.—Rocky woods, Massachusetts to Ontario, Minnesota, Texas, Alabama, and Virginia. August, September.

Of no recognized agricultural value.



FIG. 102. **MUHLENBERGIA SYLVATICA** Torr. Fl. U. S. 1: 87. 1824. WOODLAND DROPSEED.—A perennial, usually much-branched grass 6-9 dm. (2°-3°) high, with strong, scaly rootstocks, flat leaves, and narrow, densely flowered panicles 5-15 cm. (2'-6') long. Leaf-blades rough, 5-18 cm. (2'-7') long, 2-6 mm. (1"-3") wide. Spikelets (*a*, *b*) about 2 mm. (1") long; empty glumes nearly equal, very acute, one-half as long as, or nearly equaling the flowering glume; flowering glume (*c*) pilose below, scabrous above, and terminating in a slender awn 4-12 mm. (2"-6") long. A slender form, with slender, elongated, and few-flowered panicles, the outer glumes nearly equaling the inner one, is var. *GRACILIS* Scribn. Trans. Kans. Acad. Sci. 9: 116. 1885.—In rocky woods and wooded banks of streams, New Brunswick and Ontario to North Carolina, Tennessee, Texas, Kansas, and Minnesota. August to October.



FIG. 103. **MUHLENBERGIA RACEMOSA** (Michx.) B. S. P. Prel. Cat. N. Y. 67. 1888. (*Agrostis racemosa* Michx. Fl. Bor. Am. 1: 53. 1803; *M. glomerata* Trin. Unifl. 191. 1824.) **WILD TIMOTHY**.—A rather stout, upright perennial, with very tough and densely scaly rootstocks, nearly simple culms 6 to 9 dm. (2°-3°) high, and densely flowered, narrow panicles 5-10 cm. (2'-4') long. Spikelets (a) 4-6 mm. (2"-3") long, the long acuminate-pointed outer glumes nearly equal and exceeding the very acute flowering glume (b), which is densely bearded at the base.—Moist meadows and low grounds, Newfoundland to New Jersey, Missouri, Arizona, and British Columbia. June to September.

In the Northwestern States wild timothy has been recommended as an excellent hay grass. It is productive and when cut early is valuable.

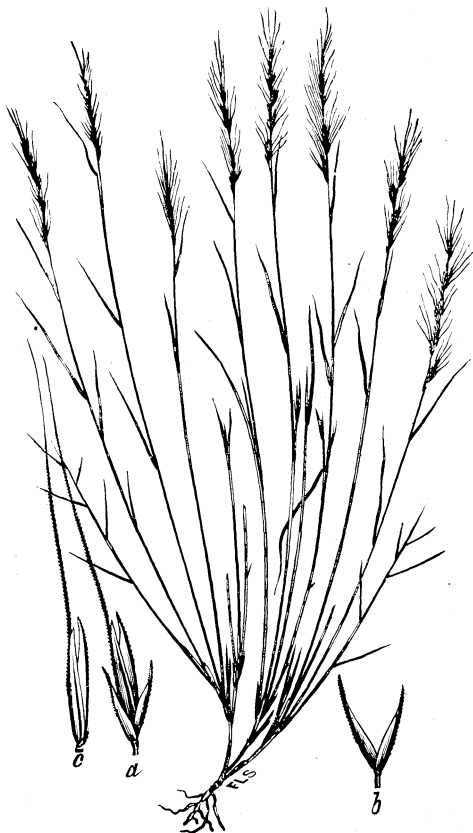


FIG. 104. **MUHLENBERGIA PRINGLEI** Scribn. Trans. N. Y. Acad. Sci. **14**: 25. 1894. (*M. sylvatica pringlei* Scribn. Bul. Torr. Bot. Club, **9**: 89. 1882. An erect, densely caespitose, wiry perennial, with simple culms 3-5 dm. (12'-20') high, involute-filiform leaves and slender, contracted, often purplish panicles 6-10 cm. (2'-4') long. Spikelets (a) nearly sessile, 3-4 mm. (1½"-2") long; empty glumes (b) acuminate-pointed, subequal, one-half to two-thirds as long as the spikelet; flowering glume (c) 4 mm. (2") long; awn slender, 10-14 mm. (5"-7") long.—Canyons, basins, and shaded ledges, mountains of New Mexico and Arizona. (Mexico.) May to September.



FIG. 105. **MUHLENBERGIA PORTERI** Scribn. in Beal, Grasses N. A. 2: 259. 1896. (*M. texana* Thurb. in Coult. Man. Bot. Rocky Mt. Reg. 410. 1885. Not Buckley, 1862.—A much-branched, native perennial, with slender, somewhat wiry stems 3–6 dm. (1°–2°) long, rather short, narrow leaves, and diffuse panicles 5–10 cm. (2′–4′) long. Spikelets (*a*, *b*) about 3 mm. ($1\frac{1}{4}$ ″) long on widely spreading capillary pedicels; empty glumes lanceolate, acute, slightly unequal, about 2 mm. (1″) long; flowering glume (*c*) thinly pubescent toward the base, 2-toothed at the apex; awn slender, 3–6 mm. ($1\frac{1}{4}$ ″–3″) long.—Dry mesas and table-lands, Texas to Arizona, Nevada, and California. (Mexico.) August, September.

Valuable for grazing and for hay.



FIG. 106. **MUHLENBERGIA GRACILLIMA** Torr. Pac. R. R. Rept. 4⁵: 155. 1857.—A densely tufted perennial, with slender culms 2-4 dm. (8'-16') high, numerous, involute basal leaves and open capillary panicles 10-20 cm. (4'-8') long. Branches of the panicle capillary, 2-12 cm. (1'-5') long. Spikelets (*a*, *b*) about 3 mm. (1¼") long; empty glumes one-half to two-thirds as long as the 2-toothed and nearly smooth flowering glume (*c*); awn slender, 2-4 mm. (1"-2") long.—Dry plains, Kansas to Colorado, Texas, and Arizona. July to October.



FIG. 107. **MUHLENBERGIA PUNGENS** Thurb. in Gray, Proc. Acad. Nat. Sci. Phila. 1863: 78. 1863.—A rigid, native perennial 3–4.5 dm. (12'–18') high, with rigid, sharp-pointed leaves and open panicles about 15 cm. (6') long. Primary branches of the panicle solitary, 5–7 cm. (2'–2½') long with spreading secondary branches at near their base in partially expanded panicles; these branches appear fasciculate. Spikelets (a) 4–5 mm. (2''–2½'') long, long-pedicellate; empty glumes bristle-pointed, about one-half as long as the short-awned flowering glume (b). Palea 2-toothed.—Dry soil, sand hills and plains, Nebraska to Utah, Texas and Arizona. July to October.

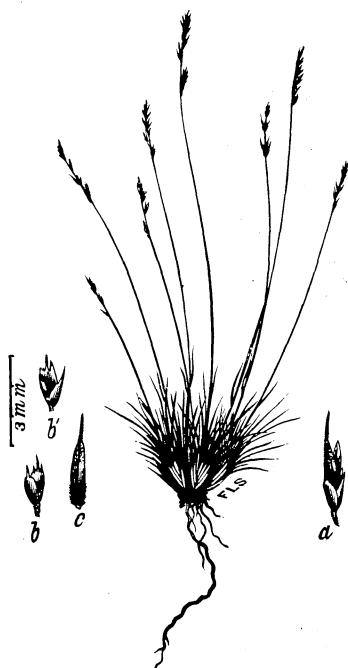


FIG. 108. **MUHLENBERGIA FILICULMIS** Vasey, Contr. U. S. Nat. Herb. 1: 267. 1893. **THREAD-LIKE MUHLENBERGIA**.—A low, tufted perennial with filiform, scape-like culms 1.5–3.5 dm. (6'–14') high, short, setaceous, radical leaves and narrow, spike-like panicles 2–5 cm. (1'–2') long. Spikelets (*a*) about 2 mm. (1") long; empty glumes 1-nerved, irregularly 3-toothed, about one-half as long as the short-awned flowering glume, which is pubescent near the base; awn about 2 mm. (1") long.—Sandy soil, Ute Pass, El Paso County, in moist prairies at Como, Park County, and on the mesas at Twin Lakes, Lake County, Colorado; alt., 2,000 to 3,000 m. (6,200°–9,500°). July to September.

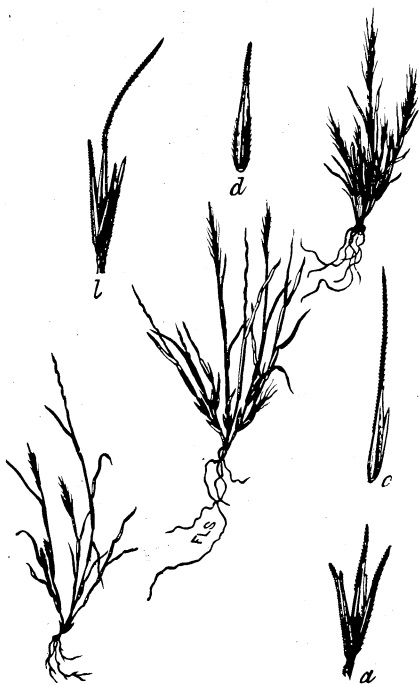


FIG. 109. **MUHLENBERGIA SCHAFFNERI** Fourn. Mex. Pl. 2 : 85. 1881.¹—A low, caespitose, branching annual 2-10 cm. (1'-4') high, with short leaves and simple, spike-like panicles. Spikelets (*a*, *b*) sessile or nearly so; empty glumes scabrous, slightly unequal, the first more or less deeply 2-toothed, the second 1-nerved and short-awned, about the length of the flowering glume (*c*, *d*); flowering glume glabrous or thinly hairy below, about 2 mm. (1") long; awn 1-7 mm. ($\frac{1}{4}$ "- $3\frac{1}{4}$ " long). The short-awned or nearly awnless form is *MUHLENBERGIA DEPAUPERATA* Scribn. Bot. Gaz. 9 : 187. 1884.—"Dry, gravelly patches of thin soil," mountains of Arizona and New Mexico. (Mexico.) September.

¹Title-page date is 1886; advance sheets issued as early as 1881. See Bibliography in American Grasses III.



FIG. 110. **MUHLENBERGIA VIRESCENS** (H. B. K.) Trin. Unifl. 193. 1824. (*Podosæmum virescens* H. B. K. Nov. Gen. et Sp. Pl. 1: 132. 1815.)—A rather slender, erect perennial about 6 dm. (2') high, with long, narrow, flat leaves and a strict, pale-green or straw-colored panicle about 15 cm. (6') long. Panicle branches 2-5 cm. (1'-2') long, flower bearing to the base. Spikelets (a) about 4 mm. (2'') long; empty glumes (b) unequal, the first 1-nerved, the longer second glume 3-nerved, lanceolate, acute or slightly 3-toothed; flowering glume (c) and palea pubescent in the lower half; awn flexuose, 10-16 mm. (4''-6'') long.—At an altitude of 1,800 to 2,400 m. (6,000°-8,000°) on the mountains of Arizona and New Mexico. (Mexico.) May to June.



FIG. 111. **MUHLENBERGIA GRACILIS** Trin. Unif. 193. 1824.—A slender but rather rigid, densely caespitose perennial 1.5-6 dm. (6'-24') high, with narrow, involute, rigid leaves and contracted panicles 8-15 cm. (3'-6') long. Spikelets 3-4 mm. (1½"-2") long; empty glumes (*a, b*) nearly equal in length, the first about one-half as long as the flowering glume, 1-nerved, acute, or erose at apex, the second a little longer than the first, 3-nerved and 3-toothed, rarely entire at apex; flowering glume (*c, d*) pubescent or scabrous on the back, ciliate on the margins; awn flexuose 8-16 mm. (4"-8") long.—Ascending to 2,700 m. (8,800') or more, Texas to Arizona, Colorado, and Wyoming. (Mexico.) June to September. A much reduced form 15-30 cm. (6'-12') high, with awns 2-4 mm. (1"-2") long is var. **BREVIARISTATA** Vasey, Contr. U. S. Nat. Herb. 3: 67. 1892.



FIG. 112. **BRACHYELYTRUM ERECTUM** (Schreb.) Beauv. Agrost. 39. 1812. (*Muhlenbergia erecta* Schreb. Besch. Gras. 2: 139, pl. 50. 1810; *B. aristatum* R. & S. Syst. 2: 413. 1817.) **BEARDED SHORT-HUSK.**—A perennial with simple culms 3–9 dm. (1°–3°) high, flat, spreading leaf-blades and few-flowered, simple, terminal panicles 5–15 cm. (2′–6′) long. Nodes and sheaths pubescent. Leaf-blades 7–15 cm. (3′–6′) long, 12–14 mm. (6″–7″) wide. Spikelets (*a*) 10–12 mm. (5″–6″) long; empty glumes (*c*) very unequal, the first minute; flowering glume (*b*) 8–12 mm. (4″–6″) long, ciliate-scabrous along the prominent nerves; awn straight, 18–25 mm. (9″–12″) long. Palea (*a*) about as long as its glume. Rachilla continued behind the palea as a slender, naked bristle, one-half to two-thirds as long as the palea.—Open, rocky woods, Newfoundland to North Carolina, Alabama, Missouri, Minnesota and Ontario. May to August.



FIG. 113. **HELEOCHLOA SCHŒNOIDES** (L.) Host, Gram. 1 : 23, pl. 80. 1801. (*Phleum schœnoides* L. Sp. Pl. 60. 1753; *Crypsis schœnoides* Lam. Tabl. Encycl. 1 : 166, pl. 42. 1791.) **RUSH-LIKE TIMOTHY**.—A diffusely branching caespitose annual 1-3 dm. (4'-12') high, with inflated sheaths, rather short, flat, spreading leaves and densely flowered, ovate, or oblong, spike-like panicles 1-3 cm. ($\frac{1}{2}$ '-1 $\frac{1}{4}$ ') long. Spikelets (a) 3 mm. ($1\frac{1}{2}$ ") long; empty glumes acute, compressed, ciliate on the keels, nearly as long as the compressed flowering glume (b) which is scabrous on the keel above. Panicles usually partly inclosed within the subtending leaf-sheath.—Waste ground about New York City, Philadelphia, etc., sparingly naturalized. (Europe and Asia.) July, August.



FIG. 114. **PHLEUM PRATENSE** L. Sp. Pl. 59. 1753. **TIMOTHY**.—A perennial with erect, simple culms 3–12 dm. (1°–4°) high and dense, cylindrical, spike-like panicles 2.5–10 cm. (1'–4') long. Empty glumes (*a*) compressed, keeled, ciliate along the keels, and abruptly mucronate or short awn-pointed; flowering glume (*b*) much shorter than the empty ones, thin, truncate. Palea about as long as the glume. The stamens and pistil are shown in *b*.—Widely cultivated and completely naturalized in fields, waysides, and waste ground throughout the United States and British America. (Europe and Asia.) June to August.

One of the best known and most widely cultivated of the hay grasses. It sometimes attains the height of 5 feet and the heads or panicles 6 to 10 inches.



FIG. 115. **ALOPECURUS GENICULATUS** L. Sp. Pl. 60. 1758. FLOATING FOXTAIL.—A slender perennial, with culms decumbent and branched at base, then erect or ascending, 1.5-6 dm. (6'-24') high, flat, spreading leaves, and dense, spike-like, slender panicles 2.5-7.5 cm. (1'-3') long. Spikelets (*a*, *b*) about 2 mm. (1/16") long; empty glumes equal, obtuse, slightly connate at the base, silky-hairy on the keels, and sparingly pilose on the sides; flowering glume (*c*) a little shorter than the outer ones, awned from near the base; awn slender, nearly twice as long as the glumes or in var. *FULVUS* (Smith) Scribn. Mem. Torr. Bot. Club, 5: 38, 1894 (*A. fulvus* Smith) barely equaling them.—Wet meadows, banks of streams and ditches throughout the United States, and from Newfoundland to British Columbia. (Europe and Asia.) April to September.

A valuable pasture grass for low, wet lands.



FIG. 116. **ALOPECURUS PRATENSIS** L. Sp. Pl. 60. 1753. MEADOW FOX-TAIL.—An erect, smooth perennial 3-9 dm. (1°-3°) high, with short, creeping rootstocks, flat, spreading leaf-blades, and dense, cylindrical, spike-like panicles 5-10 cm. (2'-4') long. Spikelets (*a*) compressed, 4-6 mm. (2"-3") long; empty glumes distinct or only slightly grown together at the base, abruptly acute, silky villous on the keels, and short pilose on the lateral nerves; flowering glume (*b*) nearly as long as the empty ones, awned on the back near or below the middle, pubescent near the apex; awn slender, slightly twisted when dry, projecting beyond the glumes.—Naturalized in fields and meadows, Labrador to southern New York, Ohio, and Michigan; also Oregon, Idaho, and California. (Europe, Asia, and Africa.) June, July.

A valuable grass for moist meadows and pastures, especially the latter. It is very hardy, and one of the earliest of our cultivated grasses.



FIG. 117. **ALOPECURUS OCCIDENTALIS** Scribn. Bot. Gaz. 11 : 170. 1886. (*A. pratensis alpestris* Thurb. in A. Gray, Proc. Acad. Nat. Sci. Phila. 1863 : 79. 1863, not Wahl. 1812. (MOUNTAIN FOXTAIL.—An erect, rather slender grass 6–9 dm. (2°–3°) high, with shorter and thicker heads than those of Meadow Foxtail. Spikelets (a) 3.5–4.5 mm. (1½"–2¼") long, compressed; empty glumes acute, long, silky-hairy on the keels and pilose on the sides; flowering glume (b) a little shorter than the empty ones, pubescent near the apex, and awned from below the middle; awn about 6 mm. (¾") long.—Wet meadows and banks of streams, high mountains of Montana, Idaho, Wyoming, and Colorado. June to September.

A valuable hay grass for northern latitudes.



FIG. 118. **PHIPPSIA ALGIDA** (Soland.) R. Br. Suppl. App. Parry's Voy. 275. 1824. (*Agrostis algida* Soland. in Phipp's Voy. 200. 1810.) PHIPPSIA.—A low, tufted, glabrous perennial 2-10 cm. (1'-4') high, with narrow, soft, and flat leaves and contracted, simple panicles. Spikelets (*a*) 1-1.5 mm. ($\frac{1}{8}$ "- $\frac{1}{4}$ " long; outer glumes (*c*) minute, unequal, acute, the third glume (*d*) broad and obtuse or erose-truncate.—Arctic North America and on the highest mountain peaks of Colorado. (Greenland, Arctic Europe, and Asia.) July, August.



FIG. 119. **SPOROBOLUS ASPER** (Michx.) Kunth, Enum. 1:210. 1833. (*Agrostis asper* Michx. Fl. Bor. Am. 1: 52. 1803.) PRAIRIE-GRASS.—A rather slender perennial 3–12 dm. (1°–4°) high, with usually long, involute-filiform leaf-blades and contracted, linear panicles 5–15 cm. (2'–6') long. Spikelets (a) 6–8 mm. (3'–4'') long; empty glumes unequal, acute, shorter than the flowering glume (b), which is very acute, pubescent toward the base, as is the long, acuminate-pointed palea, which much exceeds the glume in length.—In dry, sandy soil, open woods and glades, Long Island to Florida, west to Texas, Missouri, and Illinois. August to October. Avoided by stock, excepting when young.

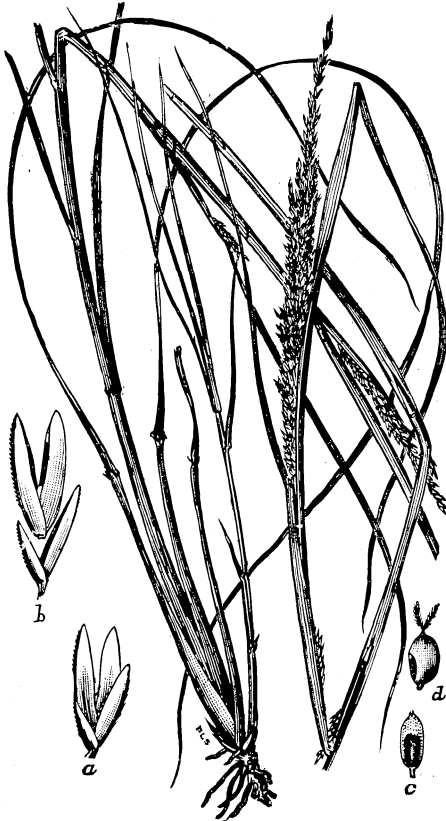


FIG. 120. **SPOROBOLUS LONGIFOLIUS** (Torr.) Wood, Class-book, 775. 1861. (*Agrostis longifolia* Torr. Fl. U.S. 1: 90. 1824.) LONG-LEAFED SPOROBOLUS.—A stout perennial 3.5–10 dm. (1° – 3°) high, with very long, attenuate-pointed leaves, and strict, spike-like panicles 8–25 cm. ($3'$ – $10'$) long, which are more or less included in the inflated leaf-sheaths. Spikelets (*a, b*) 4–5 mm. ($2''$ – $2\frac{1}{4}''$) long; empty glumes unequal, scabrous on the keel above, obtuse or subacute; flowering glume scabrous on the keel, obtuse, equaling or a little shorter than the obtuse palea.—Dry, sandy soil, Maine to Pennsylvania, South Dakota, and Utah, south to Texas and Florida. August to October.



FIG. 121. **SPOROBOLUS HETEROLEPIS** A. Gray. Man. Bot. 576. 1848. **STRONG-SCENTED SPOROBOLUS**.—A rather stout, somewhat wiry, caespitose perennial 6-9 dm. (2° - 3°) high, with very long and narrow basal leaves and loose, open panicles 7-25 cm. ($3'$ - $10'$) long. Spikelets (a) 4-5 mm. ($2''$ - $2\frac{1}{4}''$) long; outer glumes (b) very unequal, sharply acuminate-pointed, the first about half the length of the broader second glume which exceeds the flowering glume in length; flowering glume (c, d) glabrous, acute or obtuse, as long as the broad palea.—In dry soil, prairies, etc., Connecticut to Quebec, Iowa, Nebraska and Wyoming; thence south to Texas and north to Assiniboia and Saskatchewan. August, September.



FIG. 122. **SPOROBOLUS INTERRUPTUS** Vasey Bul. Torr. Bot. Club, 15: 8. 1888.—A rather stout, erect perennial, with simple culms about 4-5 dm. (16'-20') high, flat leaves, and narrow but loosely flowered panicles 10-18 cm. (4'-7') long. Spikelets (b) 6-7 mm. ($3''-3\frac{1}{2}''$) long; empty glumes broadly lanceolate, acute, the first about 3 mm. ($1\frac{1}{2}''$), the second about 5 mm. ($2\frac{1}{2}''$) long; flowering glume (c) broadly lanceolate, acute, a little shorter than its palea, which is slightly notched at the tip and has remarkably broad margins.—In forests, mountains of Arizona. August, September.



FIG. 123. **SPOROBOLUS FLORIDANUS** Chapm. Fl. So. U. S. 550. 1860.—A rather stout, erect perennial 6-12 dm. (2° - 4°) high, with long, narrow, flat leaves and diffuse panicles 2.5-5 dm. ($10'$ - $20'$) long. Pedicels capillary. Spikelets (a) about 4 mm. ($2''$) long, purplish; empty glumes unequal, broadly lanceolate, acute, the first about two-thirds as long as the spikelet; flowering glume and palea (shown at b) smooth and nearly equal.—Moist pine barrens near the coast, North Carolina to western Florida. July to September.



FIG. 124. **SPOROBOLUS CURTISSII** (Vasey) Small, U. S. Dept. Agr. Div. Agros. Bul. 7: 142, fig. 124. 1897. (*S. floridanus curtissii* Vasey, Desc. Cat. Gr. U. S. 44. 1885.)—A wiry, erect perennial 3-6 dm. (1° - 2°) high, with long, very narrow leaves, and loosely flowered, open panicles 15-25 cm. (6'-10') long. Spikelets (*a, b*) 4-5 mm. ($2''$ - $2\frac{1}{4}''$) long with nearly equal and very acute empty glumes which are slightly longer than the acute flowering glume (*c*).—Moist pine barrens, northeastern Florida. July to November. Readily separated from *S. floridanus* by its narrower leaves and longer and nearly equal empty glumes.

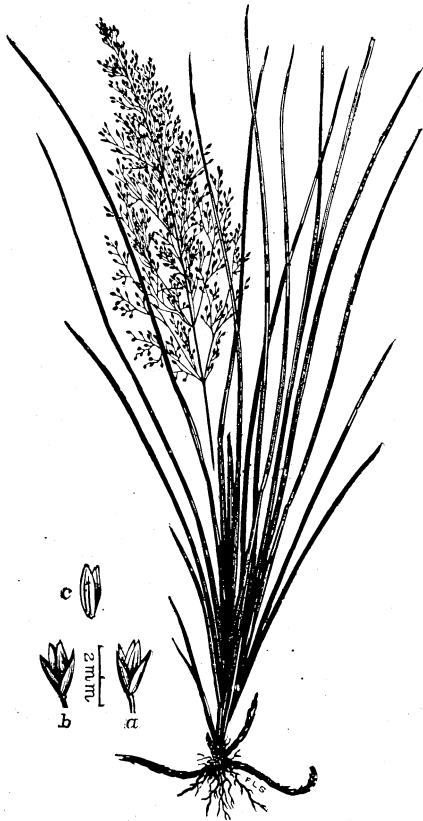


FIG. 125. **SPOROBOLUS COMPRESSUS** (Torr.) Kunth. Enum. 1: 217. 1833. (*Agrostis compressa* Torr. Cat. Pl. N. Y. 91. 1819.) **FLAT-STEMMED SPOROBOLUS.**—A caespitose perennial, with short, scaly rootstocks, flattened culms 3-6 dm. (1°-2°) high, rather long, conduplicate leaves, and open, capillary panicles 10-30 cm. (4'-12') long. Spikelets (a, b) about 1.5 mm. ($\frac{1}{4}$ ") long, outer glumes subequal, obtuse, or acute, a little shorter than the obtuse and scabrous flowering glume (c). Palea as long as the glume, obtuse.—In bogs and pine barrens, Long Island and New Jersey. September to October.



FIG. 126. **SPOROBOLUS INDICUS** (L.) R. Br. Prodr. Fl. Nov. Holl. 1:170. 1810. (*Agrostis indica* L. Sp. Pl. 68. 1753.) SMUT-GRASS.—A tufted, erect, wiry perennial 3-10 dm. (1°-3°) high, with simple culms and narrow, densely flowered, spike-like panicles 10-30 cm. (4'-12') long. Leaves 10-30 cm. (4'-12') long, 2-6 mm. (1"-3") wide, long-attenuate-pointed. Spikelets (*a*, *b*) 1.5-2 mm. ($\frac{3}{4}$ "-1") long, the unequal outer glumes obtuse, the second about one-half as long as the third or flowering glume, which is acute and slightly longer than the obtuse palea (see *d* in figure).—Abundantly naturalized in waste ground, waysides, fields, and pastures. Virginia and Tennessee to Florida, Arkansas, Texas, and California; occasional in the Eastern cities. (Native or naturalized in all tropical countries.) March to September.

Smut-grass is regarded as a valuable forage plant by some, but except when young the stems are too tough and wiry to be eaten by stock when other food can be had.



FIG. 127. **SPOROBOLUS AIROIDES** Torr. Pac. R. R. Rept. 7³: 21. 1856. (*Agrostis airoides* Torr. Ann. Lyc. N. Y. 1: 141. 1824.) FINE-TOP SALT-GRASS.—A stout, coarse, and rigid perennial 3-9 dm. (1°-3°) high, with long, narrow leaves and open, spreading panicles 10-25 cm. (4'-10') long. Spikelets (a) numerous 1.5-2 mm. ($\frac{3}{8}$ "-1") long; empty glumes broadly lanceolate, acute, the first one-half as long as the second, which about equals the flowering glume (b) in length.—Moist or dry, usually saline or alkaline soil in deserts, prairies, along streams, in meadows, etc. Nebraska and Kansas to Idaho, California, Texas and Arizona. (Mexico and Lower California.) July to September.

A coarse, tussock grass, usually growing in sandy, alkaline soils where more tender grasses will not thrive.



FIG. 128. **SPOROBOLUS ARGUTUS** (Nees) Kunth, Enum. 1 : 215. 1833. (*Vilfa arguta* Nees, Agrost. Bras. 395. 1829.)—A caespitose perennial 2-4 dm. (8'-16') high, with flat leaves and open panicles 3-8 cm. (1'-3') long, the whorled branches spreading in flower. Spikelets (a) 1.5-2 mm. ($\frac{3}{8}$ "-1") long; empty glumes (b, c) very unequal, the first scarcely one-fourth as long as the pubescent second glume which equals the third or flowering glume (d).—Sand dunes and sandy flats near river banks, Kansas and Colorado to Texas and western Louisiana; also in southern Florida. (Mexico and West Indies.) May to September.

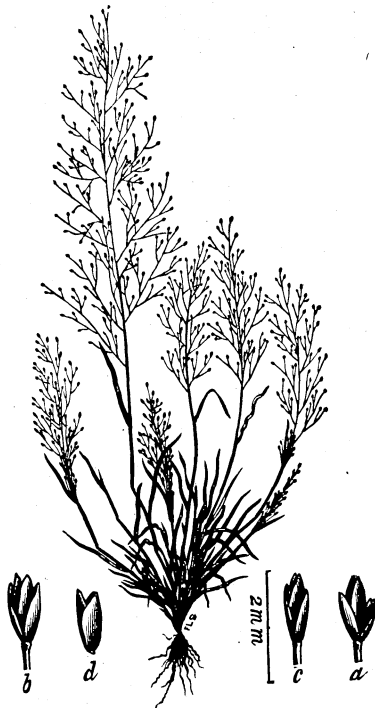


FIG. 129. **SPOROBOLUS CONFUSUS** (Fourn.) Vasey, Bul. Torr. Bot. Club, 15: 293. 1888. (*Vilfa confusa* Fourn. Mex. Pl. 2: 101. 1881; *V. ramulosa* H. B. K. Nov. Gen. et Sp. Pl. 1: 137. 1815, in part.) A slender, branching, tufted annual 0.8-2 dm. (3'-8') high, with loose sheaths, flat leaves, and capillary, ovoid, or oblong panicles 8-15 cm. (3'-6') long. Spikelets (*a*, *b*, *c*) 1 mm. ($\frac{1}{16}$ ") long; glumes obtuse, the outer empty ones nearly equal and one-half to two-thirds as long as the third or flowering glume (*d*).—Sandy banks of streams, moist places in sandy plains, canyons, etc., Texas to California, and in Colorado and Montana. (Mexico.) July to September.



FIG. 130. **EPICAMPES RIGENS** Benth. Journ. Linn. Soc. **19**:88. 1881. (*Cinna macroura* Thurb. in S. Wats. Bot. Calif. **2**: 276.. 1880, not Kunth 1835.) **DEER-GRASS**.—A stout, erect perennial, with rigid, wiry culms 9–12 dm. (3° – 4°) high, long, narrow leaves and very long, narrow, and densely flowered spike-like panicles 30–60 cm. (1° – 2°) long. Spikelets (a) 3–4 mm. ($1\frac{1}{8}''$ – $2''$) long, nearly terete; glumes minutely scabrous-pubescent, acute or obtuse, the outer ones (c) about two-thirds the length of the 3-nerved flowering glume (b).—In the foothills, Texas to Nevada, New Mexico, Arizona, and Southern California. (Mexico.) July to November.

In the regions where it grows this coarse grass is regarded as one of the best native dry-land grasses, and is always closely grazed wherever stock can get at it.

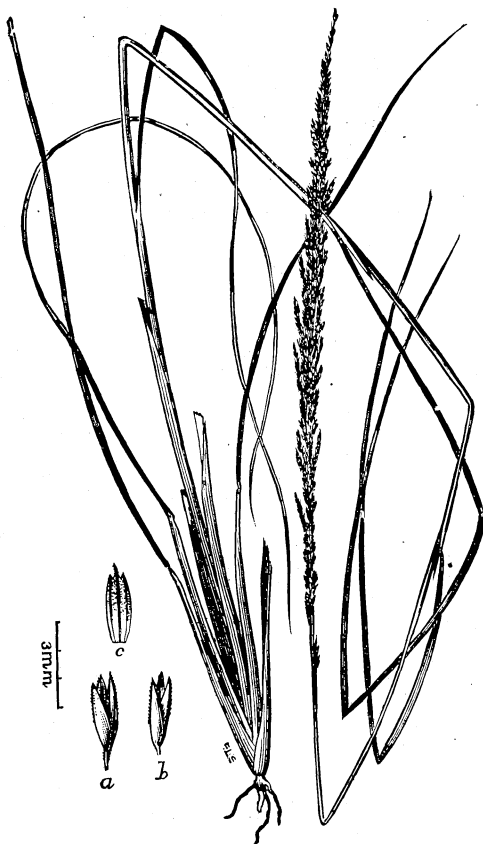


FIG. 131. **EPICAMPES LIGULATA** Scribn. Contr. U. S. Nat. Herb. 3: 58. 1892.—A stout, rigid perennial 6-12 dm. (2° - 4°) high, with narrow, very scabrous leaves and strict, rather densely flowered panicles 20-40 cm. (8'-16') long. Leaves long-attenuate-pointed, rigid, and subinvolute at the base, where they are much narrower than the rigid ligule, which is 10-30 mm. (5"-15") long. Spikelets (*a*, *b*) about 2 mm. (1") long, dark purple; glumes subequal, minutely scabrous, the distinctly 3-nerved; flowering glume (*c*) mucronate-pointed by the prolongation of the midnerve.—Cool slopes and canyons, mountains of Texas, New Mexico, and Arizona. (Mexico.) August, September.



FIG. 132. **POLYPOGON MONSPELIENSIS** (Linn.) Desf. Fl. Atl. 1: 67. 1798. (*Alopecurus monspeliensis* Linn. Sp. Pl. 89. 1753.) BEARD GRASS.—A caespitose, glabrous annual 1-9 dm. (4'-3°) high, with flat leaves and dense, many-flowered spike-like panicles 2-10 cm. (1'-4') long. Spikelets about 2 mm. (1'') long, with long-awned, nearly equal, scabrous outer glumes (a) much exceeding the broad, thin, and slender-awned flowering glume (b). The flower is shown at c in the figure.—In fields and waste places, sparingly naturalized along the Atlantic coast from New Hampshire to South Carolina; abundantly on the Pacific slope from California to Vancouver Island, and in Arizona, Nevada, and Colorado. (Europe and Asia.) April to October.



FIG. 133. **LIMNODEA ARKANSANA** (Nutt.) Dewey, Contr. U. S. Nat. Herb. 2: 518. 1894. (*Greenia arkansana* Nutt. Trans. Am. Phil. Soc. 5: 142. 1837; *Thurberia arkansana* Benth. in Vasey, U. S. Dept. Agr. Spec. Rept. 63: 16. 1883.)—A slender annual 2-6 dm. ($\frac{1}{3}$ °-2°) high, more or less geniculate at the lower nodes, with soft, flat leaves and narrow, loosely flowered panicles 8-18 cm. (3'-7') long. Sheaths glabrous or sparingly villous; ligule about 1 mm. ($\frac{1}{4}$ ") long; leaf-blades 2-10 cm. (1'-4') long, 2-4 mm. (1"-2") wide. Spikelets (a) 3-4 mm. (1 $\frac{1}{4}$ "-2") long; empty glumes equal, hard, and rigid; flowering glume (b) glabrous, cleft at the apex, bearing a somewhat bent and twisted awn 5-10 mm. (2 $\frac{1}{4}$ "-5") long.—Shell banks, woods, etc., western Florida to Arkansas and southern Texas. April to June.

In variety **PILOSA** (*Sclerachne pilosa* Trin. Mém. Acad. Pétersb. VI. 6: 275. 1845,) the outer glumes (shown by c) are pilose.



FIG. 134. *CINNA ARUNDINACEA* Linn. Sp. Pl. 5. 1753. INDIAN REED.—A tall, leafy perennial 9–21 dm. (3°–7°) high, with simple culms, flat leaf-blades, and ample pyramidal panicles 15–30 cm. (9'–18') long, contracted after flowering. Spikelets (a, b) 4–5 mm. (2''–2½'') long; empty glumes acute, scabrous, the first shorter than the second; third glume (c) usually with a very short awn just below the apex. Palea shorter than its glume (c). Rachilla often slightly prolonged behind the palea.—Shaded swamps, banks of streams, and low thickets, Newfoundland to North Carolina, Alabama, Texas, South Dakota, and the Northwest Territory. May to September.

A good grass for low, wet lands subject to overflow; it yields a large amount of good hay in such localities.



FIG. 135. **AGROSTIS HUMILIS** Vasey, Bul. Torr. Bot. Club, 10: 21. 1883, (*A. varians* Trin. Agrost. 2: 314. 1841, not Thuill. 1790. A dwarf slender perennial, 6-12 cm. ($2\frac{1}{4}$ '-5') high, with short, flat leaves and contracted, purplish panicles 2-3 cm. ($\frac{3}{4}$ '-1 $\frac{1}{4}$ ') long. Spikelets (a) about 2 mm. ($1''$) long, with nearly equal, acute, empty glumes (b) which slightly exceed the broadly obtuse flowering glume (c).—Moist meadows or mossy and springy places, at 2,100 to 3,000 m. (7,000°-8,000°) altitude, on the mountains of Colorado, Wyoming, Washington, Oregon, and Montana. August, September.



FIG. 136. *AGROSTIS COARCTATA* Ehrh. in Hoffm. Deutsch. Fl. ed. 2, 1: 37. 1800.—A creeping perennial with slender culms, the upright branches about 3 dm. (1^0) high, short, flat leaves, and narrow, rather densely flowered panicles 5–10 cm. ($2'$ – $4'$) long; branches erect, 3 cm. ($1\frac{1}{4}'$) long, or less; spikelets numerous, crowded, 2.5 mm. ($1''$) long, acute; empty glumes (*a*) hispid on the keel; flowering glume (*b*) hyaline, apex rounded or truncate. Palea one-fourth to one-half as long as the glume. Stems often prostrate.—Damp soil and sands along or near the coast, Newfoundland to New Jersey. (Europe.) July to October. A fine-leaved, excellent turf-forming species, valuable for lawns.



FIG. 137. *AGROSTIS DENSIFLORA* Vasey, Contr. U. S. Nat. Herb. 3: 72. 1892. DENSELY-FLOWERED BENT.—A rather stout, caespitose perennial 1.5–4.5 dm. (6'–18') high, with short and comparatively broad leaves and densely, many-flowered, almost spike-like panicles 3–8 cm. (1'–3¼') long. Spikelets (*a*) 2.7 mm. (1¼") long, with nearly equal, scabrous, acute, empty glumes and narrow, short-awned flowering glumes (*b*, *c*), which are about one-fourth shorter than the empty ones. The grain is shown at *e* and two anthers at *d*.—Oregon and California, along the coast, apparently rare. July, August.



FIG. 138. *AGROSTIS PRINGLEI* Scribn. U.S. Dept. Agr. Div. Agros. Bul. 7: 156, fig. 138. 1897.—A strongly stoloniferous grass, with rather slender, upright, or ascending culms 3-6 dm. (1° - 2°) high, narrow and rather rigid, flat leaves, and loosely flowered, narrow panicles 5-15 cm. (2'-6') long. Spikelets (a) 3-4 mm. ($1\frac{1}{2}$ "-2") long; outer glumes nearly equal, long-acuminate-pointed, strongly scabrous on the keel, excepting near the base; flowering glumes (b,c) much shorter than the outer ones and remarkable for the long hairs on the callus.—Plains, Mendocino County, California (Pringle), and northward to Oregon (?). August.

Probably of some value for sandy soils.



FIG. 139. **AGROSTIS DIEGOENSIS** Vasey, Bul. Torr. Bot. Club, 13 : 55. 1886. (*A. foliosa* Vasey, *ibid*, 10 : 63. 1883, not Hort. 1833.)—A strong-growing, leafy perennial 6–10 dm. (2° – $3\frac{1}{4}^{\circ}$) high, from creeping rootstocks, with pale-green, narrow, and many-flowered panicles 15–20 cm. (6'–8') long, the branches erect, 3–7 cm. (1'–3') long, flowering above the middle. Leaf blades scabrous, 10–18 cm. (4'–7') long, 2–4 mm. (1''–2'') wide; ligule acute, 4 mm. (2'') long. Spikelets (a) 2–3 mm. (1''–1 $\frac{1}{4}$ '') long; empty glumes (b) subequal, ovate-acute; flowering glume (c) obtuse, about 2 mm. (1'') long, bearing a short awn above the middle, or awnless. Palea wanting.—Mountains of southern California to Washington. May to August.



FIG. 140. *AGROSTIS ELLIOTTIANA* Schult. Mant. 2: 373. 1824. (*A. arachnoides* Ell. Sk. Bot. S. C. and Ga. 1: 134. 1817, not Poir. 1810.) SPIDER BENT-GRASS.—A low, branching annual with weak culms rarely exceeding 3 dm. (1°) in height, narrow flat leaves and diffuse, capillary panicles about one-half as long as the culm. Spikelets 1.5–2 mm. ($\frac{1}{4}$ "–1" long; empty glumes (a) equal, one-fourth longer than the flowering glume (b, c), which is obtuse, 2-toothed, and bears a very slender, scabrous awn near the apex, five to six times its own length.—Dry hillsides and old fields, South Carolina to Kentucky and Missouri, south to Florida and Texas. April, May.



FIG. 141. **GASTRIDIMUM LENDIGERUM** (L.) Gaudin. Fl. Helv. 1: 176. 1828. (*Milium lendigerum* Linn. Sp. Pl. ed. 2, 91. 1762; *G. australe* Beauv. Agrost. 21. 1812.) NIT-GRASS.—A smooth annual 1.5–6 dm. ($\frac{1}{2}$ –2°) high, with flat leaves and a strict, spike-like panicle 7–15 cm. (3'–6') long. Spikelets (a) 4–6 mm. (2''–3'') long, with unequal, acute, empty glumes and short, pubescent flowering glumes (b, c), which are awned just below the truncate apex; awn slender, 4–5 mm. (2''–2 $\frac{1}{4}$ '') long.—Hills, naturalized, California and Oregon; also in Texas. (Southern Europe.) June, July.
Cultivated for ornament.



FIG. 142. *CALAMAGROSTIS CRASSIGLUMIS* Thurb. in S. Wats. Bot. Calif. 2: 281. 1880.—A rigid, erect perennial 1.5–4 dm. ($\frac{1}{2}$ – $1\frac{1}{2}$ °) high, from creeping rootstocks, with plané or involute leaves 5–10 cm. (2'–4') long, 3–6 mm. ($1\frac{1}{4}$ "–3") wide, and dense, oblong, spike-like panicles 4–6 cm. ($1\frac{1}{2}$ '–2½') long. Spikelets (a, b) ovate, acute, 4–5 mm. (2"–2½") long, the outer glumes very firm in texture, a little exceeding the broad flowering glume (c), which is awned just below the middle; awn stout, as long as or slightly exceeding the glume. Callus hairs (d) abundant, two-thirds as long as the glume.—Wet ground and gravelly lake shores, California to Vancouver Island. July, August.

Allied to *C. hyperborea*, from which it differs in its small size, short and comparatively wide leaf-blades; small panicle; broad-ovate, acute, and very thick, empty glumes.

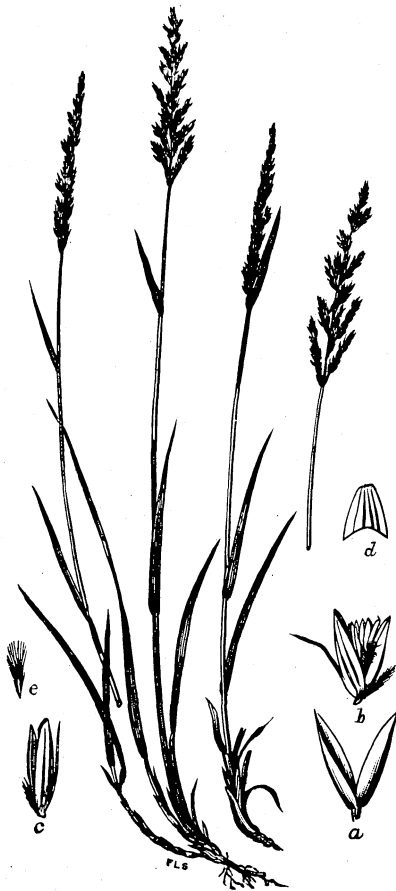


FIG. 143. **CALAMAGROSTIS BREVISETA** (A. Gray) Scribn. Mem. Torr. Bot. Club, 5 : 41. 1894. (*C. sylvatica breviseta* A. Gray, Man. Bot. 582. 1848; *C. pickeringii* A. Gray, *ibid.*, ed. 2, 541. 1856.) **SHORT-AWNED REED-GRASS**.—A slender perennial 3–5 dm. (1°–2°) high, with flat leaves and narrow or subpyramidal, rather densely flowered, purplish panicles 8–12 cm. (3′–5′) long. Spikelets 3–4 mm. (1¼″–2″) long; empty glumes (*a*) acute, somewhat exceeding the obtuse scabrous flowering glume (*b*, *c*), the geniculate awn equaling or slightly exceeding the glume; the rudiment (*e*) and basal hairs short.—Moist ground, Newfoundland, Cape Breton Island, and Labrador to the mountains of New Hampshire, Vermont, and New York. July, August.

Varieties: 1. **DEBILIS**. Kearney, U. S. Dept. Agr. Div. Agros. Bul. 11 : 25. 1898. Of softer texture with more slender culms, thin, lax leaves, and smaller, contracted, almost spiciform panicles. 2. **LACUSTRIS** Kearney l. c. Taller, 5–10 dm. (2°–3¼°) high, with stouter rootstocks, longer leaves and panicles, shorter palea, and more copious and longer callus hairs, three-fourths as long as the flowering glume.



FIG. 144. **CALAMAGROSTIS DESCHAMPSIODES** Trin. Icon. Gram. 3 : 354. 1836.—A slender, caespitose perennial with culms 1.5–3 dm. ($\frac{1}{2}^{\circ}$ – 1°) high, from creeping rootstocks, with narrow leaves 3–7 cm. ($1\frac{1}{4}$ '– $3\frac{1}{4}$ ') long and open, pyramidal panicles 4–8 cm. ($1\frac{1}{4}$ '– $3\frac{1}{4}$ ') long. Spikelets (a) 4 mm. ($2''$) long, with nearly equal, acute, empty glumes about the length of the awned flowering glume (b); awn stout, longer than the glume. Callus hairs abundant, about one-third as long as the glume.—Pribilof Islands, Alaska. (Kamchatka.) August.



FIG. 145. *CALAMAGROSTIS ALEUTICA* Bong. Veg. Ins. Sitcha, 171. 1831.— A stout, erect perennial 6-15 dm. (2° - 5°) high, with long and rather stiff, flat leaves and densely many-flowered, narrow panicles 15-30 cm. (6'-12') long. Spikelets 5-6 mm. ($2\frac{1}{4}$ "-3") long, with nearly equal acuminate-pointed empty glumes (c) which are a little longer than the awned flowering glume (d); awn inserted just below the middle of the glume, which it barely equals. Callus hairs few and short.—Along the seashore, in rocky or marshy places, Alaska and Unalaska to California. June to September.

Var. *PATENS* Kearney, U. S. Dept. Agr. Div. Agros. Bul. 11 : 20. 1898. A form with geniculate culms flat leaf-blades, and open, ovate panicles 2 dm. (8') long, the primary branches wide-spreading, finally horizontal. California.



FIG. 146. **CALAMAGROSTIS TWEEDYI** Scribn. in Vasey, Contr. U. S. Nat. Herb. 3: 83. 1892. (*Deyeuxia tweedyi* Scribn. Bul. Torr. Bot. Club, 10: 64. 1883.)—A stout perennial 7–10 dm. ($2\frac{1}{2}$ °– $3\frac{1}{4}$ °) high, with rather broad, flat leaves and densely flowered spike-like panicles 8 to 12 cm. (3'–5') long. Sheaths loose, striate, smooth; ligule 2–4 mm. (1"–2") long, decurrent; leaf-blades flat, 6–10 mm. (3"–5") broad, 15–20 cm. (6'–8') long, those of the culm shorter. Spikelets 5–6 mm. ($2\frac{1}{4}$ "–3") long with lanceolate, acute, empty glumes (a) which are scabrous on the back and a little longer than the awned flowering glume (b); awn stout, inserted below the middle and about 6 mm. (3") long. Callus hairs few, about 1 mm. ($\frac{1}{8}$ ") long.—Cascade Mountains, Washington.

A unique species with no near ally, remarkable for its robust culms, broad leaves, and dense panicles.



FIG. 147. *CALAMAGROSTIS BOLANDERI* Thurb. in S. Wats. Bot. Calif. 2: 280. 1880.—A stout perennial 6–15 dm. (2° – 5°) high, with flat leaves 10–30 cm. (4'–12') long, 4–8 mm. ($2''$ – $4''$) wide, and expanded, dark purple panicles 8–20 cm. (3'–8') long. Spikelets (a) 3 mm. ($1\frac{1}{4}''$) long, with equal, lanceolate, empty glumes (b), and minutely rough-tuberculate, awned, flowering glumes (c, d, e); awn inserted near the base, exceeding the glumes. Callus hairs few, about one-third as long as the glume, those of the rudiment about one-half as long as the glume. Palea slightly shorter than the glume, 2-nerved, and 2-toothed at the apex. Northern California.

This species is unique in the peculiar granular roughening of its flowering glumes. It has no near relative among the North American species.



FIG. 148. **CALAMAGROSTIS HOWELLII** Vasey, Bot. Gaz. 6: 271. 1881. (*Deyeuxia howellii* Vasey, Descr. Cat. Grasses U. S. 51. 1885.)—A densely caespitose, erect, leafy perennial 2.5–5 dm. (1° – $1\frac{1}{2}^{\circ}$) high, with long narrow basal leaves, and open panicles 8–15 cm. (3'–6') long. Spikelets 5–6 mm. ($2\frac{1}{4}$ "–3") long, with lanceolate-acuminate empty glumes (a), the floral ones (b, c) cleft at the apex; awn from below the middle, about 15 mm. (7") long; basal hairs as long as the flowering glume, those of the rudiment (d) longer.—High mountains, Oregon and Washington. June to August.

A well marked and handsome species, remarkable for its long setaceous leaves, both radical and cauline, and for its open panicle and conspicuous awns.



FIG. 149. **AMMOPHILA ARENARIA** (L.) Link, Hort. Berol. 1 : 105. 1827. (*Arundo arenaria* Linn. Sp. Pl. 82. 1753; *Ammophila arundinacea* Host.) BEACH-GRASS, MARRAM-GRASS.—A coarse erect perennial, with creeping rootstocks, rigid, culms 6-12 dm. (2° - 4°) high, long leaves, and narrow, densely flowered, spike-like terminal panicles 12-30 cm. (5'-12') long. Spikelets 10-12 mm. (5''-6'') long, with compressed and nearly equal, acute empty glumes, (a), the flowering glume (b) with a tuft of hairs at its base.—Sandy coasts of the Atlantic from New Brunswick south to Virginia, and shores of the Great Lakes; also in California. (Europe.) July-October.

This species is one of the most valuable grasses adapted to binding the drifting sands of our coasts, and is extensively cultivated for this purpose in this as well as in other countries. It has also been used for the manufacture of coarse paper, and it makes an excellent and durable thatch. It is of no value as fodder.



FIG. 150. **CALAMOVILFA BREVIPILIS** (Torr.) Scribn. in Hack. True Grasses, 113. 1890. (*Arundo brevipilis* Torr. Fl. U. S. 1:95. 1824.) **SHORT-HAIRED REED-GRASS.**—A rather slender, smooth perennial 9–12 dm. (3° – 4°) high, with very narrow leaves and open panicles 8–24 cm. (4'–10') long. Sheaths shorter than the internodes; ligule a fringe of very short hairs; leaf-blades 1.5–3 dm. (6'–12') long, 3 mm. ($1\frac{1}{4}$ ") wide or less. Spikelets (a) 4–5 mm. ($2''$ – $2\frac{1}{4}''$) long, with unequal acute empty glumes, the longer second one a little shorter than the flowering glume (b), which is pubescent on the keel below; basal hairs one-third as long as the glume.—Sandy swamps in the pine barrens of New Jersey. August, September.



FIG. 151. **HOLCUS LANATUS** Linn. Sp. Pl. 1048. 1753. VELVET GRASS.—A perennial 3-6 dm. (1°-2°) high, with creeping rootstocks, flat leaves, and open panicles, 5-8 cm. (2'-3') long; usually densely pubescent all over with soft, whitish hairs. Spikelets (a) 4 mm. (2'') long, with white-hairy empty glumes, and glabrous flowering glumes (b) 2 mm. long, the first obtuse and awnless, the second bearing a hooked awn just below the apex.—Introduced into this country from Europe with other grasses and now widely distributed. Nova Scotia to Ontario and Illinois south to North Carolina and Tennessee, also on the Pacific coast, especially in Oregon and Washington. May to August.

This grass is not well liked by stock and possesses little nutritive value. It is of some value, however, on peaty or sandy soils where the better grasses will not grow.



FIG. 152. **AIRA CARYOPHYLLEA** Linn. Sp. Pl. 66. 1753. SILVERY HAIR-GRASS.—A slender, tufted, glabrous annual 1-4 dm. (4'-16') high, with short leaves and small-flowered, open panicles 2-10 cm. (1'-4') long. Sheaths mostly basal; ligule 3 mm. ($1\frac{1}{8}$ ") long; leaf-blades 1-5 cm. ($\frac{1}{2}$ '-2') long, involute-setaceous. Spikelets (a) 2-3 mm. (1"-1 $\frac{1}{4}$ ") long with equal acute empty glumes and very acutely 2-toothed, awned flowering glumes (b); awns 3-4 mm. (1 $\frac{1}{8}$ "-2") long.—In sandy waste places, Massachusetts to Virginia; also on the Pacific coast. Introduced from Europe. May to August.

Of no agricultural value.



FIG. 153. *AIRA PRÆCOX* Linn. Sp. Pl. 65. 1753. EARLY WILD OAT-GRASS.—A tufted, erect or ascending annual 2-15 cm. ($1'$ - $6'$) high, with a contracted panicle 1-2 cm. ($\frac{1}{2}'$ - $1'$) long. Sheaths clothing the whole culm; ligule about 3 mm. ($1\frac{1}{4}''$) long; leaf-blades 2 cm. ($1'$) long or less, involute-setaceous. Spikelets (a) 3 mm. ($1\frac{1}{4}''$) long, with equal acute empty glumes and acuminate, 2-toothed, awned, flowering glumes (b) about 3 mm. ($1\frac{1}{4}''$) long; awns 3-4 mm. ($1\frac{1}{2}''$ - $2''$) long.—Introduced and sparingly distributed in the Middle States near the coast, growing in sandy soil. Also on Vancouver Island. (Europe.) May to July.



FIG. 154. **DESCHAMPSIA HOLCIFORMIS** Presl, Rel. Haenk. 1: 251. 1830. CALIFORNIAN HAIR-GRASS.—A stout, erect perennial 6–15 dm. (2° – 5°) high, with long and rather rigid basal leaves and densely flowered, more or less interrupted panicles 12–24 cm. (5'–10') long. Spikelets (a) about 6 mm. ($3''$) long with acute empty glumes and ovate-lanceolate, irregularly 4-toothed, awned flowering glumes (b) which are silky-tufted at the base; awn stout, inserted near the base and barely exceeding the glume.—Moist meadows, California, near the coast. April.



FIG. 155. **DESCHAMPSIA FLEXUOSA** (Linn.) Trin. Gram. Suppl. 66. 1836. (*Aira flexuosa* Linn. Sp. Pl. 65. 1753.) TUFTED HAIR-GRASS.—A slender, erect perennial about 6 dm. (2°) high, with involute-setaceous, radical leaves and diffuse panicles 5–20 cm. (2'–8') long. Sheaths much shorter than the internodes; ligule 2 mm. (1") long or less; leaves smooth beneath, scabrous above, the basal ones very numerous. Spikelets (a, b) 4.5–5 mm. (2¼"–2½") long; empty glumes about as long as the florets; flowering glumes (c) 4 mm. (2") long, hairy at the base; awn twisted and geniculate, exceeding the glumes.—Labrador southward along the mountains to North Carolina and Tennessee, and westward from New York to Wisconsin. (Greenland and Europe.) May to August.

This grass has little value, but is of some importance in forming woodland pastures, as it grows well in shady places.



FIG. 156. **DESCHAMPSIA ELONGATA** (Hook.) Munro in Benth. Pl. Hartweg. 342. 1857. (*Aira elongata* Hook. Fl. Bor. Am. 2: 243. t. 288. 1840.) **SLENDER HAIR-GRASS**.—A slender perennial 3–12 dm. (1° – 4°) high, with narrow panicles 1.5–3.5 dm. (6'–14') long. Leaf-blades involute 2–15 cm. (1'–3') long; ligule membranaceous, nearly acute, 2–4 mm. (1''–2'') long, decurrent. Spikelets (*a*) about 4 mm. (2'') long, with nearly equal, very acute 3-nerved, empty glumes, exceeding the florets (*b*); first flowering glume about 2 mm. (1'') long, irregularly 5-toothed at the apex, with a slender awn from near the base twice its own length or more.—Montana to British Columbia and southward on the Pacific Slope to Mexico. May to August.



FIG. 157. **DESCHAMPSIA CALYCINA** Presl, Rel. Haenk. 1: 251. 1830. (*Aira danthonioides* Trin. Mem. Acad. St. Petersburg, VI., Sci. Math. Phys. et Nat., 1: 57. 1831.) OAT-LIKE HAIR-GRASS.—A rather slender, erect, caespitose grass 1-7 dm. ($\frac{1}{3}$ °-2 $\frac{1}{4}$ °) high, with more or less spreading panicles. Spikelets (a) 6-8 mm. (3"-4") long with linear-lanceolate, 3-nerved, and nearly equal empty glumes; flowering glumes (b, c) 2-3 mm. (1"-1 $\frac{1}{4}$ ") long, awned just below the middle; awn 3-4 times the length of the glume.—Native along the Pacific Slope from Canada to California, eastward to Utah, and southward through Mexico to Peru. April to July.



FIG. 158. **DESCHAMPSIA ATROPURPUREA** (Wahl.) Scheele, Flora, 27: 56. 1844. (*Aira atropurpurea* Wahl. Fl. Lapp. 37. 1812.) MOUNTAIN HAIR-GRASS.—A slender alpine grass 1.5–4 dm. ($\frac{1}{2}$ °–1 $\frac{1}{2}$ °) high, with flat leaves and few-flowered, nodding panicles 3–12 cm. (1'–5') long. Sheaths shorter than the internodes; ligule 2 mm. (1") long or less, truncate; leaf-blades 2–4 mm. (1"–2") wide, 5–10 cm. (2'–4') long, slightly scabrous above. Spikelets (a) about 5 mm. (2 $\frac{1}{4}$ ") long with ovate-lanceolate, acute empty glumes and erose-truncate, awned flowering glumes (b) 2.3 mm. (1 $\frac{1}{4}$ ") long; awns bent, much exceeding the glumes.—Labrador, White Mountains, Adirondacks, Rocky Mountains in Colorado, northward to Alaska. (Northern Europe and Asia.) July to September.



FIG. 159. **TRISETUM PENNSYLVANICUM** (Linn.) Beauv. in R. & S. Syst. 2: 658. 1817. (*Avena pennsylvanica* Linn. Sp. Pl. 79. 1753; *A. palustris* Michx. 1803; *Trisetum palustre* Torr. 1824.) MARSH OAT-GRASS.—A slender, loosely tufted perennial 6–9 dm. (2°–3°) high, with flat, soft leaves and loosely flowered, nodding, and yellowish-green panicles 5–20 cm. (2'–8') long. Sheaths shorter than the internodes, somewhat scabrous; ligule 1 mm. ($\frac{1}{4}$ ") long; leaf-blades 2–15 cm. (1'–6') long, 2–6 mm. (1"–3") wide, scabrous. Spikelets 2-flowered with subequal empty glumes; floral glumes 4–5 mm. (2"–2 $\frac{1}{4}$ ") long, the first awnless or rarely with a rudiment, the second with a long bent and twisted awn.—On moist rocks, along brooks, in wet meadows, etc., Massachusetts to Illinois, south to Florida and Louisiana; British Columbia. April to June.



FIG. 160. **TRISETUM SUBSPICATUM** (Linn.) Beauv. Agrost. 180. 1812. (*Aira subspicata* Linn. Syst. Nat. ed. 10, 673. 1759; *Avena mollis* Michx. Fl. Bor. Am. 1: 72. 1803.) **DOWNY OAT-GRASS**.—A slender, erect perennial 1.5–4.5 dm. ($\frac{1}{2}^{\circ}$ – $1\frac{1}{2}^{\circ}$) high, with usually downy culms and leaves, and densely many-flowered, spike-like panicles, 2.5–12 cm. (1'–5') long. Sheaths usually shorter than the internodes; ligule 1–2 mm. ($\frac{1}{4}$ "–1") long; leaf-blades 2–10 cm. (1'–4') long, 1–4 mm. ($\frac{1}{8}$ "–2") wide. Spikelets (a) 2–3-flowered, the larger second empty glume about 5 mm. ($2\frac{1}{2}$ " long; flowering glumes (b, c) 4–5 mm: (2"– $2\frac{1}{2}$ " long, awned, the awns bent and twisted at least when dry.—Widely distributed in the cooler temperate regions of both hemispheres, ranging in North America from Labrador to Alaska and extending southward in the Eastern States to the mountains of North Carolina and Tennessee, and in the West to New Mexico and California. (Europe, Asia.) June to September.



FIG. 161. **TRisetum MONTANUM** Vasey, Bul. Torr. Bot. Club, 13: 118. 1886. **ROCKY MOUNTAIN OAT-GRASS**.—A slender, erect, or ascending native grass 3–8 dm. (1° – $2\frac{1}{4}^{\circ}$) high, with narrow, flat leaves and many-flowered, more or less contracted panicles 8–12 cm. ($3'$ – $5'$) long. Leaves of the sterile shoots 15–25 cm. ($6'$ – $10'$) long, slightly scabrous. Spikelets (a) 2-flowered, the rachilla hairy; first glume lanceolate 4 mm. ($2''$) long, 1-nerved; second glume 5 mm. ($2\frac{1}{4}''$) long, 3-nerved; flowering glumes (b) linear-lanceolate, with few short hairs at the base, about 5 mm. ($2\frac{1}{4}''$) long; awn diverging when dry 3–6 mm. ($1\frac{1}{4}''$ – $3''$) long.—Mountains of Colorado and New Mexico. July, August.



FIG. 162. **TRISETUM INTERRUPTUM** Buckl. Proc. Acad. Nat. Sci. Phila. 1862: 180. 1862. SLENDER OAT-GRASS.—A slender, erect annual 2-5 dm. (8'-20') high, with rather short, soft leaves and narrow, elongated panicles 4-10 cm. (1½'-4') long. Culms densely pubescent, with short reflexed hairs below the nodes, otherwise smooth; sheaths loose, pubescent, shorter than the internodes; ligule hyaline, obtuse or truncate, 2 mm. (1'') long; leaf-blades mostly plane, pubescent. Spikelets (a) 2- to 4-flowered, 4-5 mm. (2''-2¼'') long; empty glumes (a) equal, broadly oblanceolate, acute; flowering glumes (b) equaling the empty glumes, cleft at the apex, bearing a scabrous awn about 8 mm. (4'') long.—Colorado to Texas, Arizona, and southern California. March to May.



FIG. 163. **TRISETUM CANESCENS** Buckl. Proc. Acad. Nat. Sci. Phila. 1862: 100. 1862. SILVERY OAT-GRASS.—An erect perennial 3-12 dm. (1° - 4°) high, with flat leaves, and more or less densely flowered panicles 12-18 cm. (5'-7') long. Sheaths rather loose, pubescent, the lower ones exceeding the internodes; ligule truncate, hyaline, about 3 mm. ($1\frac{1}{4}$ ") long; leaf-blades linear-lanceolate, plane, scabrous, pubescent, 5-25 cm. (2'-10') long, 5-10 mm. ($2\frac{1}{4}$ "-5") wide. Spikelets (a) 6-8 mm. (3 "- 4 ") long; first glume lanceolate, acute; floral glume (b), cleft one-third from the apex, 6 mm. (3 ") long; awn attached at the base of the cleft, hispid, about 12 mm. (6") long.—In dry, open ground, open woods, thickets, and wet meadows, California to British Columbia, east to Montana. May to September.



FIG. 164. **TRISETUM CERNUUM** Trin. Mém. Acad. Pétersb. VI., Sci. Math. Phys. et Nat. 1: 61. 1831. NODDING OAT-GRASS.—A slender perennial 6-10 dm. (2° - $3\frac{1}{4}^{\circ}$) high, with rather broad, flat leaves and loosely flowered, nodding panicles 12-20 cm. ($5'$ - $8'$) long. Spikelets (a) 6-8 mm. ($3''$ - $4''$) long, 2-, 3-, or rarely 4-flowered; first glume acute, 2-3 mm. ($1''$ - $1\frac{1}{2}''$) long, hispid on the keel; second glume obtuse or acute, 4 mm. ($2''$) long; flowering glumes (b) scabrous, with few hairs at the base, oval-lanceolate, obscurely 5-nerved, cleft at the apex; awn arising below the base of the cleft, 6-10 mm. ($3''$ - $5''$) long.—Alaska to northern California and eastward to Idaho. May to July.



FIG. 165. **AVENA AMERICANA** Scribn. U. S. Dept. Agr. Div. Agros. Bul. 7: 183, fig. 165. 1897. (*A. pratensis* var. *Americana* Scribn. Bot. Gaz. 11: 177. 1886; *A. hookeri* Scribn. in Hack. True Grasses, 123. 1890.) AMERICAN OAT-GRASS.—A rigidly erect perennial 3-6 dm. (1° - 2°) high, with narrow, firm leaves, and contracted panicles 8-12 cm. (3'-5') long. Sheaths exceeding the internodes; ligule obtuse, hyaline, about 4 mm. ($2''$) long; leaf-blades rigid 5-15 cm. (2'-6') long, 2-5 mm. ($1''$ - $2\frac{1}{4}''$) wide, acute or obtuse. Spikelets (*a*) about 14 mm. ($7''$) long, 4- to 5-flowered; empty glumes lanceolate, about as long as the spikelet, slightly scabrous on the keel; flowering glumes about 12 mm. ($6''$) long, smooth, the awn attached near the middle, geniculate, twisted below, scabrous.—Open thickets and prairies, Manitoba, and in the foothills of the Rocky Mountains southward to Colorado. June to August.



FIG. 166. **AVENA MORTONIANA** Scribn. Bot. Gaz. 21: 133. 1896. MORTON'S OAT-GRASS.—A densely caespitose, erect perennial 1-2.5 dm. (4'-10') high, with rather rigid leaves and narrow, simple panicles of 1- to 2-flowered spikelets which are about 10 mm. (5") long; empty glumes (a) lanceolate-acute, the first 1-nerved, the second 3-nerved; flowering glumes (b) 8-9 mm. (4"-4½") long, glabrous or scabrous above; callus densely pilose; awn twisted below, scabrous, 14-16 mm. (7"-8") long.—At 3,900 to 4,200 m. (11,700°-12,600°) altitude, mountains of Colorado. August.

Allied to *A. americana* Scribn., from which it is distinguished by its smaller habit, shorter panicles, and smaller, fewer-flowered spikelets.



FIG. 167. **ARRHENATHERUM ELATIUS** (Linn.) Beauv. Agrost. 56. 1812. (*Avena elatior* Linn. Sp. Pl. 79. 1753.) TALL OAT-GRASS.—A loosely tufted perennial 6-12 dm. (2°-4°) high, with flat leaves and narrow, loosely flowered panicles 15-20 cm. (6'-8') long. Spikelets (a) 8-10 mm. (4''-5'') long; second glume larger than the first, 3-nerved, about equaling the florets; flowering glumes (b) about 8 mm. (4'') long; awn geniculate near the middle, twisted below, divergent above; grain pubescent.—In fields and waste places, Maine and Ontario to Georgia and Tennessee, also on the Pacific coast. Introduced from Europe as a fodder grass and now widely naturalized. June to August.



FIG. 168. **DANTHONIA SPICATA** (Linn.) Beauv. in R. & S. Syst. 2 : 690. 1817. (*Avena spicata* Linn. Sp. Pl. 80. 1753.) WILD OAT-GRASS.—A smooth, slender, erect perennial 2.5-5 dm. (1°-2°) high, with few-flowered, narrow panicles 2.5-5 cm. (1'-2') long, spreading only in flower. Sheaths shorter than the internodes; ligule very short; leaves scabrous, generally involute, 2 mm. (1'') wide, or less, the lower ones 10-15 mm. (4'-6') long. Spikelets (a) 5- to 8-flowered, with glabrous empty glumes 8-10 mm. (4''-5'') long and sparingly pilose; 2-toothed flowering glumes (b, d) about 4 mm. (2'') long, the teeth short and acute; awn geniculate, spreading, twisted at the base. The palea is shown by f, and the pistil and lodicules by e.—Common in dry, thin soils from Canada southward to the Gulf States and westward to Texas. May to September.



FIG. 169. **DANTHONIA COMPRESSA** Austin in Peck, Rept. Reg. N. Y. State Univ. 22 : 54. 1869. **TENNESSEE OAT-GRASS**.—A slender, erect tufted perennial 2-6 dm. ($\frac{3}{4}$ °-2°) high, with long, narrow root leaves, and few-flowered open panicles 5-12 cm. (2'-5') long. Sheaths shorter than the internodes; ligule pilose; leaves 2 mm. (1") wide or less, rough, lax, the basal ones from one-third to one-half as long as the culm. Spikelets (a) 5 to 10 flowered, 8-12 mm. (4"-6") long; empty glumes (b, c) glabrous; flowering glumes (d, e) pubescent with appressed silky hairs, the teeth 2-3 mm. (1"-1 $\frac{1}{4}$ ") long, acuminate; awn erect or somewhat geniculate, strongly twisted below. The palea is shown by f.—Mountain regions of eastern Tennessee and North Carolina northward to Canada. June to August.

In the mountains of North Carolina and Tennessee this grass forms the bulk of the forage of the so-called "balds" or parks. It is highly nutritious and withstands trampling and grazing well.



FIG. 170. **DANTHONIA SERICEA** Nutt. Gen. 1:71. 1818. SILKY OAT-GRASS.—A rather stout, erect perennial 3-9 dm. (1° - 3°) high, with usually pubescent sheaths, rather rigid leaves, and terminal, few-flowered panicles 5-10 cm. (2'-4') long. Sheaths shorter than the internodes, usually villous; leaf-blades 2-3 mm. ($1''$ - $1\frac{1}{4}''$) wide, flexuous, the basal ones one-fourth to one-half as long as the culm. Spikelets (a) 4 to 10 flowered; empty glumes 14-16 mm. ($7''$ - $8''$) long, glabrous; flowering glumes (b) strongly pilose on the back and densely, silky-bearded on the margins below, the teeth 2-3 mm. ($1''$ - $1\frac{1}{4}''$) long, acuminate; awn straight or somewhat bent, twisted below.—Open woodlands in dry soil, Massachusetts and New Jersey to Florida and west to Tennessee and Alabama. May, June.

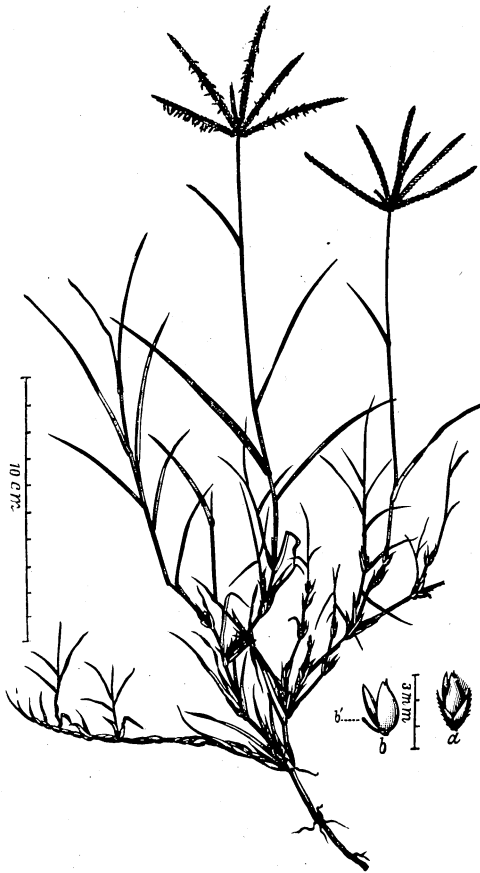


FIG. 171. **CYNODON DACTYLON** (Linn.) Pers. Syn. 1: 85. 1805. (*Panicum dactylon* Linn. Sp. Pl. 85. 1753; *Capriola dactylon* Kuntze, Rev. Gen. Pl. 2: 764. 1891.) **BERMUDA GRASS**.—A creeping perennial, with upright or ascending leafy flowering branches 1-6 dm. ($\frac{1}{2}$ °-2°) high. Sheaths glabrous or somewhat hairy, crowded at the base of the culms and along the stolons; ligule pilose; leaf-blades plane 2.5-5 cm. (1'-2') long, 1-2 mm. ($\frac{1}{8}$ "-1") wide. Spikelets (*a*) 2 mm. (1") long; empty glumes hispid on the keel, about two-thirds as long as the flowering glume (*b*), which is boat-shaped and usually ciliate on the keel; *b'* is the prolongation of the rachilla.—Widely dispersed over the tropical and warmer temperate regions of the world, in the United States from Pennsylvania southward to Florida and westward to Texas and California. April to October.

This species is one of the most valuable forage grasses for the South and is widely cultivated. It grows freely on poor or sandy soil where other grasses will not thrive and resists extreme drought and high temperatures. It is also useful for binding drifting sands and for holding embankments subject to wash. It makes a pleasing lawn grass and is extensively cultivated for this purpose in the South and Southwest.



FIG. 172. **SPARTINA POLYSTACHYA** (Michx.) Ell. Sk. Bot. S. C. and Ga. 1: 95. 1816. (*Trachynotia polystachya* Michx. Fl. Bor. Am. 1: 64. 1803.) SALT REED-GRASS.—A stout, erect perennial 12-27 dm. (4° - 9°) high, with long, flat leaves and terminal panicles of twenty to fifty crowded, ascending spikes 5-10 cm. (2'-4') long. Sheaths imbricate, crowded at the base; ligule a ring of hairs; leaf-blades 3 dm. (1°) long or more, 12-24 mm. ($6''$ - $12''$) wide, plain, scabrous at least on the margins, long-attenuate. Spikelets (a) 8-10 mm. ($4''$ - $5''$) long, the first glume half the length of the second, which much exceeds the third or flowering glume (b).—Brackish marshes along the coast, Maine to Mississippi. July to October.



FIG. 173. **SPARTINA CYNOSUROIDES** (Linn.) Willd. Enum. 80. 1809. (*Dactylis cynosuroides* Linn. Sp. Pl. 71. 1753.) CORD-GRASS.—A stout, erect perennial 6–18 dm. (2° – 6°) high, with unbranched, smooth culms from strong, scaly creeping rootstocks, long, tough leaf-blades, and five to twenty spikes, forming a terminal panicle. Sheaths crowded below; leaf-blades 3 dm. (1°) long or more, 6–14 mm. ($3''$ – $7''$) wide, scabrous on the margins, attenuate. Spikelets (*a*, *b*) 12–14 mm. ($6''$ – $7''$) long; outer glumes awn-pointed, strongly hispid on the keel, the second much exceeding the first; flowering glumes (*c*) equaling the first glume, the scabrous mid-nerve terminating just below the 2-toothed or emarginate apex. Palea often exceeding the glume.—River banks and lake shores, also brackish coast marshes, Maine and Nova Scotia to Assiniboia and Oregon, south to New Jersey, western Tennessee, Texas, and Colorado. July to October.

When cut early this grass makes a fair but coarse hay, and it has been used successfully in the manufacture of twine and paper. The strong, creeping rootstocks adapt it for binding loose sands and river banks, and in the West it is used for thatch.

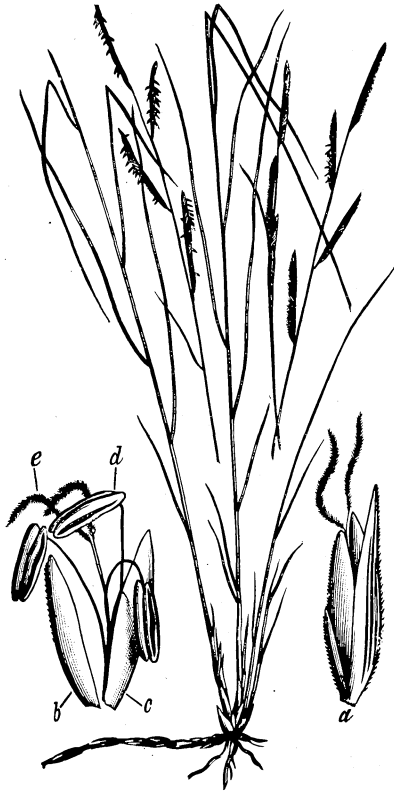


FIG. 174. **SPARTINA PATENS** (Ait.) Muhl. Gram. 55. 1817. (*Dactylis patens* Ait. Hort. Kew. 1 : 104. 1789; *Spartina juncea* Ell. Sk. Bot. S. C. and Ga. 1 : 94. 1816.) **FOX-GRASS**.—A rather slender and somewhat wiry grass 3-9 dm. (1° - 3°) high, with two to four slender, erect, or widely spreading spikes 2-5 cm. ($1'$ - $2'$) long. Sheaths overlapping and crowded; leaf-blades 1.5-3 dm. ($\frac{1}{4}^{\circ}$ - 1°) long, 2-4 mm. ($1''$ - $2''$) broad, involute, smooth beneath. Spikelets (a) 6-8 mm. ($3''$ - $4''$) long; empty glumes acute, the first about one-half as long as the second; flowering glume (b) emarginate or 2-toothed at the apex, exceeded by the palea (c).—Salt marshes and sandy shores along the coast from Newfoundland to Florida and westward to Texas. June to September.

This species is abundant on the salt marshes, and in common with black-grass (*Juncus gerardi*) furnishes most of the salt hay that these meadows produce. It is also useful for packing glassware, crockery, etc., and is much used for this purpose.



FIG. 175. *SPARTINA GRACILIS* Trin. Agrost. 1: 88. 1840. WESTERN CORD-GRASS.—A comparatively slender, perennial species 3-9 dm. (1°-3°) high, with flat leaves, and three to nine rather short, appressed spikes, 2-5 cm. (1'-2') long. Leaf-blades 3 dm. (1°) long or less, 2-6 mm. (1"-3") wide, plane or sometimes involute, attenuate. Spikelets (a) 6-8 mm. (3"-4") long; empty glumes acute, scabrous-hispid on the keel, the first one-half the length of the second; flowering glume (b) obtuse, slightly shorter than the second and about equaling the obtuse palea.—Meadows, swamps, and river bottoms, especially in alkaline soils, South Dakota to Kansas, west to British Columbia, Nevada, and California. March to August.



FIG. 176. **SPARTINA JUNCIFORMIS** Engelm. & Gray, Bost. Journ. Nat. Hist. 5:238. 1845. (*S. densiflora* Brongn. (?) in Duperr. Voy. Coq. Bot. 14. 1829; *S. gouini* Fourn. Mex. Pl. 2:135. 1881.) RUSH-LIKE SPARTINA.—A stout perennial 6-15 dm. (2°-5°) high, with very long, narrow leaves and short, appressed spikes, which form a cylindrical, spike-like inflorescence 10-30 cm. (4'-12') long. Leaf-blades involute, rigid, those of the sterile shoots 3-6 dm. (1°-2°) long. Spikelets (a) 6-8 mm. (3"-4") long; empty glumes ciliate-hispid on the keel, the first linear, obtuse or acute, the second truncate or emarginate; flowering glume (b) slightly longer than the first glume. Palea narrowly ovate, about as long as the glume.—Brackish marshes along the Gulf coast, Key West, Florida to Texas. (Mexico and Chile?) June to October.



FIG. 177. *SPARTINA STRICTA MARITIMA* (Walt.) Scribn. Mem. Torr. Bot. Club, 5:45. 1894. (*Dactylis maritima* Walt. Fl. Car. 77. 1788; *Spartina glabra* Muhl. Gram. 54. 1817.) CREEK SEDGE, or THATCH.—An erect and often stout, salt-marsh grass from 6-24 dm. (2°-8°) high, with long, flat leaves and few or many, erect, appressed spikes. Spikelets (a) 12-16 mm. (6"-8") long, loosely imbricated; empty glumes acute, the first shorter than the second, which exceeds or equals the flowering glume. Palea (b) exceeding the flowering glume.

In *S. STRICTA ALTERNIFLORA* (Lois.) A. Gray, Man. Bot. ed. 2, 552. 1856. (*Spartina alterniflora* Lois. Fl. Gall. 2:719. 1807.) The culms are 12-18 dm. (4°-6°) high, spikes slender, appressed, 8-13 cm. (3'-5') long; spikelets barely overlapping.

Along ditches and creeks of the salt marshes of both the Atlantic and Pacific coasts. July to October.



FIG. 178. **CAMPULOSUS AROMATICUS** (Walt.) Trin. in Steud. Nom. ed. 2, 1 : 272. 1840. (*Ægilops aromatica* Walt. Fl. Car. 249. 1788; *Ctenium americanum* Spreng. Syst. 1 : 274. 1825.) **TOOTHACHE-GRASS**.—An erect perennial 9-12 dm. (3° - 4°) high, from strong, lemon-scented and pungent rootstocks, with narrow leaves and usually a single, terminal, curved, pectinate spike 4-10 cm. ($1\frac{1}{4}$ '-4') long. Sheaths shorter than the internodes, rough; ligule 2 mm. ($1''$) long, truncate; leaf-blades 3-15 cm. ($1'$ -6') long, 2-4 mm. ($1''$ - $2''$) wide, plane, or involute, smooth. Spikelets (*a*) about 6 mm. ($3''$) long, the second glume bearing just above the middle a stout horizontal or recurved awn; third, fourth, and fifth glumes (*b*) membranous, scabrous, awned from below the 2-toothed apex, the fifth subtending a perfect flower, the others empty.—Southern Virginia to Florida and westward to Mississippi. July to August.

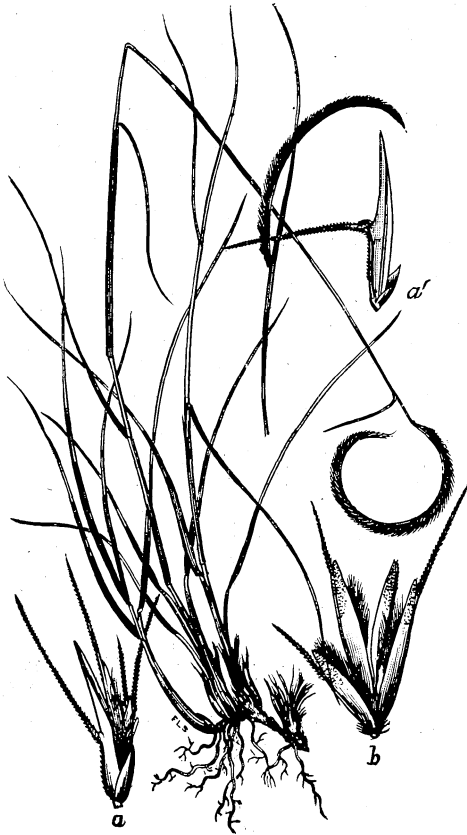


FIG. 179. **CAMPULOSUS CHAPADENSIS** Trin. Icon. Gram. 3: 303. 1836. (*Ctenium chapadense* Doell in Mart. Fl. Bras. 2³: 73. 1878.)—An erect perennial 8–12 dm. ($2\frac{1}{4}^{\circ}$ – 4°) high, with narrow leaves and usually single terminal, more or less curved spikes 5–15 cm. (2'–6') long. Sheaths loose, shorter than the internodes; leaf-blades rigid, involute, 10–20 cm. (4'–8') long, 3–4 mm. ($1\frac{1}{8}$ "–2") wide. Spikelets about 4 mm. (2") long, exclusive of the awns; first glume about 2.5 mm. ($1\frac{1}{4}$ ") long, bearing an awn at the apex of about the same length; second glume 1 mm. ($\frac{1}{8}$ ") longer, bearing an erect dorsal awn; flowering glume (b) strigose above, ciliate on the margins. The empty glumes of *C. aromaticus* are shown by a'.—Florida, in the "flat woods" region (South America). July to October.

More slender than *C. aromaticus*, with narrower glumes and more delicate and longer awns, and smaller spikelets, divergent from the axis, not pectinate.



FIG. 180. **CHLORIS GLAUCA** (Chapm.) Vasey, U. S. Dept. Agr. Spec. Rept. 63 : 32. 1883. (*Eustachys glauca* Chapm. Fl. So. U. S. 557. 1860.) SMOOTH CHLORIS.—A strong-growing perennial with diffusely spreading and ascending compressed culms 6-15 dm. (2° - 5°) high, bearing 10-25 slender, terminal spikes 6-15 cm. ($2\frac{1}{4}$ '-6') long. Sheaths compressed, broadest at the base; leaf-blades 2.5 dm. (10') long, 15 mm. ($7\frac{1}{8}$ ") wide or less, rounded at the apex, smooth on both sides, scabrous on the margins. Spikelets (a) about 2 mm. (1") long; glumes four, the first boat-shaped, acute, about one-half as long as the second, which, exclusive of the awn, is 1.5 mm. ($\frac{3}{4}$ ") long, hispidulous; third and fourth glumes (b, c) obtuse, awnless.—Brackish marshes and along the borders of cypress swamps, Florida. July to September.



FIG. 181. **CHLORIS NEGLECTA** Nash, Bul. Torr. Bot. Club, **22** : 423. 1895. (*Eustachys neglecta* Nash, *ibid*, **25** : 450. 1898.)—A rather stout perennial 6–12 dm. (2° – 4°) high, with compressed culms and sheaths, flat leaves 10–35 cm. (4'–14') long, and four to six terminal spikes 8–12 cm. ($3\frac{1}{2}'$ –5') long. Sheaths keeled, striate; leaf-blades folded, at least when dry, glabrous except on the scabrous margins, obtuse. Spikelets exclusive of the awns, about 3 mm. ($1\frac{1}{4}''$) long; empty glumes (a) 1-nerved, scabrous on the keel; flowering glumes (c, d, e) pilose, awned.—Low pine lands, Florida. July to October.

Closely allied to and much resembling *C. floridana*, but differing from that species in its more numerous spikes, smaller spikelets, and shorter third glume, which has a longer pubescence.



FIG. 182. **CHLORIS PETRÆA** Sw. Prod. Veg. Ind. Occ. 25. 1788. (*Eustachys petraea* Desv. Nuov. Bul. Soc. Philom. 2: 189. 1810.) SEASIDE FINGERGRASS.—A creeping, glaucous perennial 3-11 dm. (1° - $3\frac{1}{4}^{\circ}$) high, with obtuse, flat leaves and three to eleven slender spikes 4-7 cm. ($1\frac{1}{2}$ '-3') long. Leaf-blades 1-3 dm. (4'-12') long, 5-10 mm. ($2\frac{1}{8}$ "-5") wide. Spikelets (a, b) about 2 mm. (1") long; glumes 4, the outer ones (d) broad; the first glume acute, about three-fourths as long as the second, hispidulous, 2-toothed at the apex, the awn about 0.5 mm. ($\frac{1}{4}$ ") long; third glume (c, e) with a short awn; fourth glume rounded at apex, awnless. The palea is shown by f.—North Carolina to Florida and southeastern Texas. (West Indies and Central and South America.) March to October.



FIG. 183. **CHLORIS FLORIDANA** (Chapm.) Vasey, U. S. Dept. Agr. Spec. Rept. 63: 32. 1883. (*Eustachys floridana* Chapm. Fl. So. U. S. 557. 1860.)—A smooth, rather slender perennial 3-10 dm. (1° - $3\frac{1}{4}^{\circ}$) high, with compressed culms and sheaths, flat leaves, and one or two spikes 6-8 cm. ($2\frac{1}{2}$ '- $3\frac{1}{2}$ ') long. Leaf-blades folded, at least when dry, scabrous on the margins, acute, 1-3 dm. ($4'$ - $12'$) long, 4-8 mm. ($2''$ - $4''$) wide. Spikelets exclusive of awns 3-3.5 mm. ($1\frac{1}{8}''$ - $1\frac{1}{4}''$) long; first glume (a) two-thirds as long as the second, which is about 2.5 mm ($1\frac{1}{4}''$) long, minutely pubescent, 2-lobed at the apex, bearing an awn 1 mm. ($\frac{1}{8}''$) long or less; flowering glume (b, c) pilose, the awn inserted just below the apex. Palea (e) about as long as the glume. The spikes in this species and in *C. neglecta* are stouter than in *C. petraea*.—Dry, sandy soil, Florida. July to October.

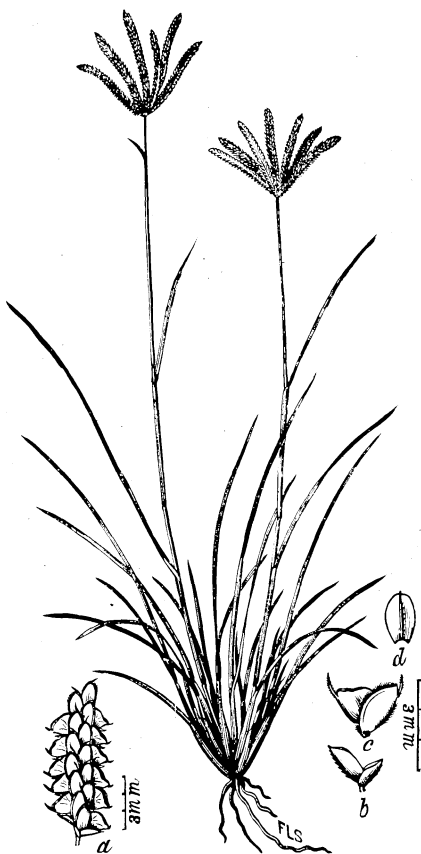


FIG. 184. *CHLORIS CUCULLATA* Bisch. Ann. Sci. Nat. Bot. III, 19: 357. 1853.—A rather slender, caespitose perennial 2-4 dm. (4° - $2\frac{1}{2}^{\circ}$) high, with narrow, flat leaves and eight to twelve spikes 2-4 cm. (1'-2') long, digitate or umbellate at the apex of the culms. Leaf-blades 2-15 cm. (1'-6') long, 3 mm. ($1\frac{1}{2}''$) wide, or less, erect, scabrous on both surfaces. Spikelets exclusive of the awns 2 mm. ($1''$) long, or slightly smaller; first glume (b) acute, about one-half as long as the second, which is about 1.5 mm. ($\frac{3}{4}''$) long; third glume (c) obtuse, pilose on the keel, and lateral nerves, the awn inserted just below the apex. The palea is shown by d.—Sandy plains, Texas to Arkansas. March to September.

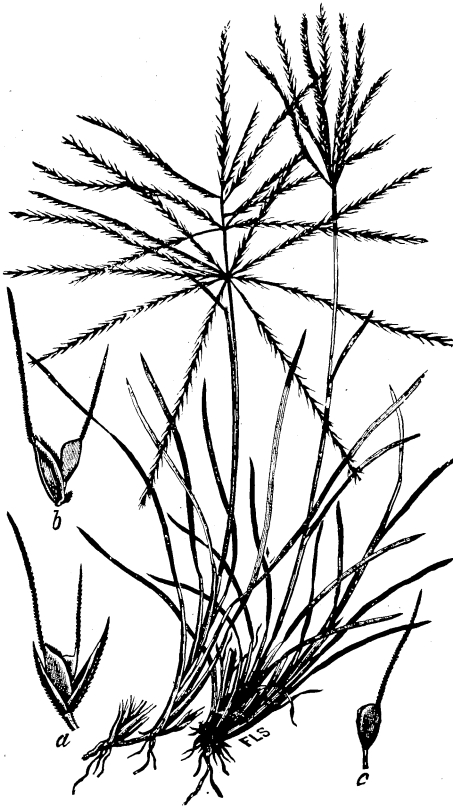


FIG. 185. *CHLORIS VERTICILLATA* Nutt. Trans. Am. Phil. Soc. II. 5: 150. 1833-37. WINDMILL-GRASS.—A low, spreading perennial, with rather stout upright flowering branches 1.5-5 dm. ($\frac{1}{4}^{\circ}$ - $1\frac{1}{4}^{\circ}$) high and numerous widely spreading, slender spikes 8-13 cm. (3'-5') long. Sheaths exceeding the internodes, with few long hairs at the throat and margins; leaf-blades obtuse or often acuminate, scabrous above, smooth beneath. Spikelets (a) about 3 mm. ($1\frac{1}{2}''$) long; first and second glumes scabrous on the keel, lanceolate, aristate-acute; flowering glume (b) 3-nerved, bearing a slender scabrous awn 8-10 mm. (4''-5'') long, the fourth, sterile glume (c) broadly obovate, bearing an awn 6-8 mm. (3''-4'') long.—Prairies, Kansas to Texas. May to September.

This species is abundant in many localities and is an excellent grass for grazing, and one not easily tramped out. It is also a good turf-forming species and has some value as an ornamental grass.



FIG. 186. **CHLORIS ELEGANS** H. B. K. Nov. Gen. et Sp. Pl. 1: 166. t. 49. 1815. (*C. alba* Presl, Rel. Haenk. 1: 289. 1830.)—An erect perennial 3-9 dm. (1° - 3°) high, with slightly inflated sheaths, flat leaves, and eight to twelve silky-bearded spikes 2-8 cm. ($1'$ - $3'$) long, clustered or umbellate at the apex of the culms. Leaf-blades 1-20 cm. ($1\frac{1}{2}'$ - $8'$) long, 2-6 mm. ($1''$ - $3''$) wide, erect or ascending, smooth beneath, scabrous above. Spikelets, exclusive of awns, 4 mm. ($2''$) long, hairy at base; empty glumes (*a*) lanceolate, often purplish, acuminate, the first three-fifths as long as the second, which is about 3 mm. ($1\frac{1}{4}''$) long; flowering glume about 3 mm. ($1\frac{1}{4}''$) long, glabrous or pilose with short hairs, bearing an awn 5-10 mm. ($2\frac{1}{4}''$ - $5''$) long. Palea (*c*) about as long as the glume.—Dry mesas and desert hills of western Texas, southern Arizona, New Mexico, southern California, and southward. An ornamental grass. June to November.



FIG. 187. **CHLORIS POLYDACTYLA** (L.) Sw. Prod. Veg. Ind. Occ. 26. 1788. (*Andropogon polydactylon* L. Sp. Pl. ed. 2. 1483. 1763.) **MANY-SPIKED CHLORIS**.—A rather stout, leafy perennial 5-10 dm. ($1\frac{1}{4}^{\circ}$ - $3\frac{1}{4}^{\circ}$) high, with numerous, more or less flexuous, brownish spikes 8-13 cm. ($3'$ - $5'$) long; leaves 6 dm. (2°) long or less, 1 cm. ($5''$) wide or less, attenuate, usually densely pilose on the upper surface at the base. Spikelets, exclusive of awn, 3 mm. ($1\frac{1}{2}''$) long; glumes 6, outer ones (a) acuminate, the first three-fourths as long as the second; third glume (b) pilose, the hairs of the lateral nerves much exceeding the glume, the brown awn inserted just below the apex, 3-4 mm. ($1\frac{1}{4}''$ - $2''$) long.—Florida. (West Indies and South America.)



FIG. 188. **CHLORIS NEALLEYI** Nash, Bul. Torr. Bot. Club, **25**: 435. 1898. (*Chloris texensis* Nash, *ibid*, **23**: 151. 1896.)—A smooth, glaucous perennial 3–6 dm. (1°–2°) high, the crowded lower sheaths compressed, with flat leaves and two to eight slender, terminal, digitate spikes 10–18 cm. (4'–7') long, which are pilose and naked at the base or with a few scattered spikelets. Spikelets (*a*), exclusive of awn, about 4 mm. (2") long; glumes four, the outer ones often purplish, the first three-fourths as long as the second; third glume (*c*) 4 mm. (2") long, bearing an awn 6–9 mm. (3"–4½") in length. Palea as long as the glume.—Texas. (Mexico?)

The larger third and fourth glumes, together with the glabrous midnerve of the former and different shape of the latter readily distinguish this from *C. verticillata*.



FIG. 189. **TRICHLORIS FASCICULATA** Fourn. Mex. Pl. 2:142. 1881. (*T. blanchardiana* Scribn. Bul. Torr. Bot. Club, 9: 146. 1882.)—A rather stout perennial 5-10 dm. ($1\frac{1}{2}$ °-3°) high, with long, narrow leaves and many slender, bearded spikes, which are fasciculate or subdigitate at the apex of the culm. Sheaths compressed, ciliate-fringed, hispid; leaf-blades plane or involute, acuminate, 8-20 cm. (3'-8') long. Spikelets linear-lanceolate with one fertile and one sterile flower; empty glumes (*a*, *b*) awned; flowering glume (*d*) scabrous on the back, obscurely 3-nerved, 2.5 mm. ($1\frac{1}{4}$ ") long, terminating in three scabrous awns 10-18 mm. (5"-9") long. At *c* the flowering glume is shown with the inclosed palea and sterile floret.—Dry plains and mesas, Texas to Arizona. May to September.

This species has long been known to florists under the name of *Chloropsis blanchardiana*, and is esteemed as an ornamental grass.



FIG. 190. *TRICHLORIS PLURIFLORA* Fourn. Mex. Pl. 2:142. 1881. MANY-FLOWERED TRICHLORIS.—A glaucous, erect perennial 6-12 dm. (2° - 4°) high, with long, flat leaves, and numerous erect, many-flowered spikes 8-15 cm. ($3'$ - $6'$) long. Sheaths loose, smooth; leaf-blades 2-2.5 dm. ($8'$ - $10'$) long, 6-8 mm. ($3''$ - $4''$) wide, scabrous on both sides. Spikelets nearly sessile, 3 to 4 flowered, 4-5 mm. ($2''$ - $2\frac{1}{4}''$) long; the first glume (a) one-half to two-thirds as long as the second; flowering glumes (b) scabrous, ciliate on the margins, 4 mm. ($2''$) long, terminating in three scabrous awns, the middle one 8 mm. ($4''$) long, the lateral ones about 2 mm. ($1''$) long. Palea (c) lanceolate, its hyaline margins infolded.—Southern and western Texas. (Mexico.) May to July.

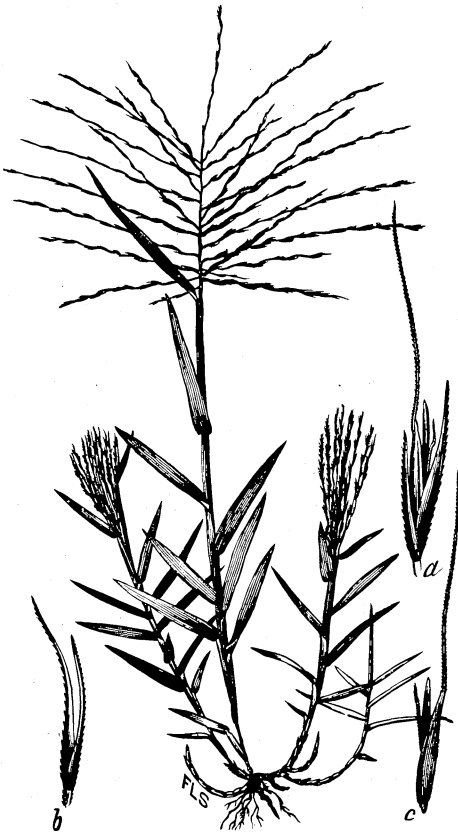


FIG. 191. **GYMNOPOGON AMBIGUUS** (Michx.) B. S. P. Prel. Cat. N. Y. 69. 1888. (*Andropogon ambiguus* Michx. Fl. Bor. Am. 1:58. 1803. *G. racemosus* Beauv. Agrost. 164. 1812.) **NAKED BEARD-GRASS**.—A loosely tufted erect or ascending perennial 3-6 dm. (1° - 2°) high, with short and broad leaf-blades and numerous (fifteen to thirty) slender, and widely spreading spikes 10-20 cm. (4'-8') long, spikelet-bearing throughout, irregularly scattered along the common rachis. Sheaths short, glabrous, excepting a villous ring at the summit, crowded at the base of the culm; leaves 2-10 cm. (1'-4') long, 4-12 mm. (2"-6") wide, lanceolate, acute. Spikelets (a) 5-6 mm. ($2\frac{1}{4}$ "-3") long; empty glumes (b) unequal; flowering glume (c) shorter than the second glume; awn 4-6 mm. (2"-3") long. Callus hairy.—Dry soil, fields, hillsides, and borders of woods, New Jersey, Indian Territory, Texas, and Florida. July to October.

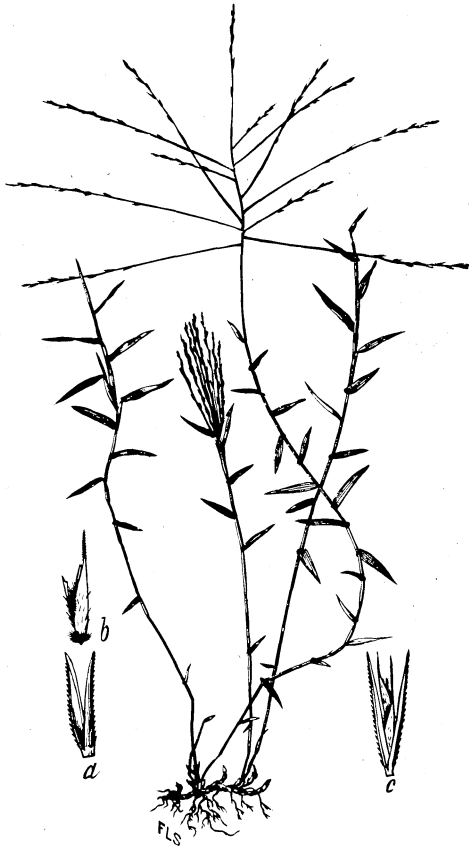


FIG. 192. *GYMNOPOGON BREVIFOLIUS* Trin. Unif. 238. 1824. SHORT-LEAFED BEARD-GRASS.—A slender, loosely tufted and many-jointed perennial, with erect or ascending culms 3-6 dm. (1°-2°) high, short, flat leaves and numerous very slender spikes, which are naked toward the base. Sheaths shorter than the internodes, often crowded near the middle of the culm; ligule very short; leaf-blades 2-5 cm. (1'-2') long, 2-8 mm. (1"-4") wide, lanceolate, acute, cordate at the base. Branches of the panicle at first erect, finally wide-spreading. Spikelets (c) exclusive of awns 3 mm. (1¼") long; flowering glume (b) equaling the second glume, short-awned, sparingly villous or glabrous. Callus hairy.—Dry or moist pine barrens near the coast, New Jersey to Mississippi. August to November.

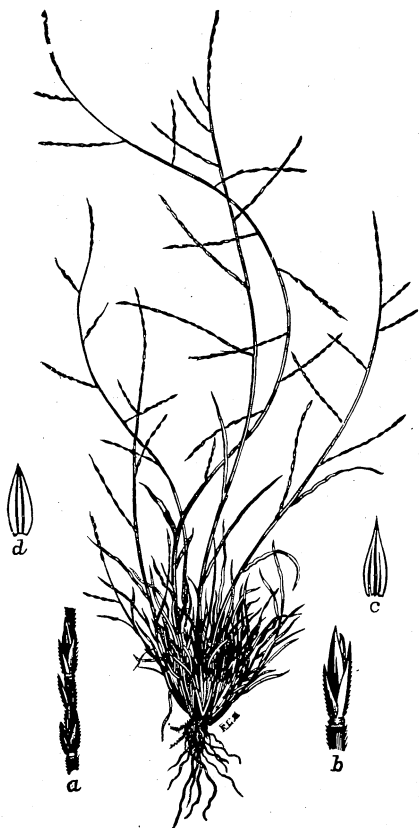


FIG. 193. **SCHEDONNARDUS PANICULATUS** (Nutt.) Trelease in Branner & Coville, Rept. Geol. Surv. Ark. 1888⁴: 236. 1891. (*Lepturus paniculatus* Nutt. Gen. 1: 81. 1818; *Schedonnardus texanus* Steud. Syn. Pl. Gram. 146. 1854.) TEXAN CRAB-GRASS.—A low, diffusely branching annual, with short, narrow leaves and numerous slender, paniculate spikes, 2–10 cm. (1'–4') long, and tufted stems from 1–9 dm. ($\frac{1}{4}$ °–3°) high. Sheaths loose, compressed; ligule acute, lacerate, decurrent; leaf-blades plane or folded, spirally twisted, smooth, 5–8 cm. (2'–3') long. Spikelets (b) sessile and appressed as shown in a, 3–4 mm. ($1\frac{1}{4}$ "–2") long; alternate; empty glumes lanceolate, 1-nerved; flowering glume (c) 3-nerved, scabrous on the keel, slightly pubescent at the base. Palea (d) ovate, 2-nerved, 2.5–3 mm. ($1\frac{1}{4}$ "–1 $\frac{1}{2}$ ") long.—Dry prairies, Illinois to Texas and New Mexico, north to Assiniboia and Manitoba.

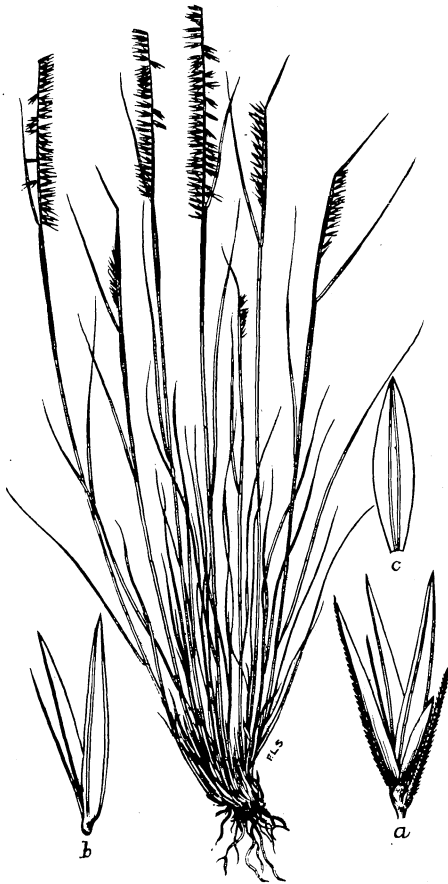


FIG. 194. **BOUTELOUA UNIFLORA** Vasey, Bot. Gaz. 16: 26. 1891. ONE-FLOWERED GRAMA.—A slender, erect perennial 3-4.5 dm. (1° - $1\frac{1}{4}^{\circ}$) high, with narrow, long-attenuate-pointed leaves and numerous (twenty to seventy-five) spreading or deflexed 1-flowered spikes approximate along the common axis, each bearing one spikelet (*a*) 6-8 mm. ($3''$ - $4''$) long, subtended by a glume-like prolongation of the rachis; second empty glume twice as long as the first, slightly exceeding the flowering glume (*b*), which is minutely 3-toothed; rudiment reduced to a single awn, shorter than the glume. The palea is shown at *c*. Leaves narrow, subinvolute, one-half as long as the culm.—Southwestern Texas. September.



FIG. 195. *BOUTELOUA CURTIPENDULA* (Michx.) Torr. in Emory, Notes Mil. Recon. 153. 1848. (*Chloris curtipendula* Michx. Fl. Bor. Am. 1: 59. 1803; *Bouteloua racemosa* Lag. Varied. Cienc. Lit. Art. 2⁴: 141. 1805.) TALL GRAMA or SIDE OATS.—A densely tufted perennial 3-9 dm. (1°-3°) high, with numerous (twenty to sixty), usually spreading or reflexed spikes scattered along the common axis, forming a long, somewhat one-sided raceme 20-40 cm. (8'-16') long. Sheaths loose, sparsely pubescent; leaf-blades 10-30 cm. (4'-12') long, 4 mm. (2'') wide, scabrous. Spikes (a) 6-16 mm. (3''-8'') long, reflexed. Spikelets (b) 7-10 mm. (3¼''-5'') long; empty, glumes unequal, the first awn-pointed, the second acute; flowering glumes (c) about 4 mm. (2'') long, with three short awns.—Dry fields, hillsides, and prairies, Ontario and Manitoba south to New Jersey, Mississippi, Texas, and California. (Mexico, Central and South America.) May to October.

This grass when abundant makes good hay, which is readily eaten by stock, and the numerous basal leaves afford good pasturage in the arid and semiarid regions of the west.

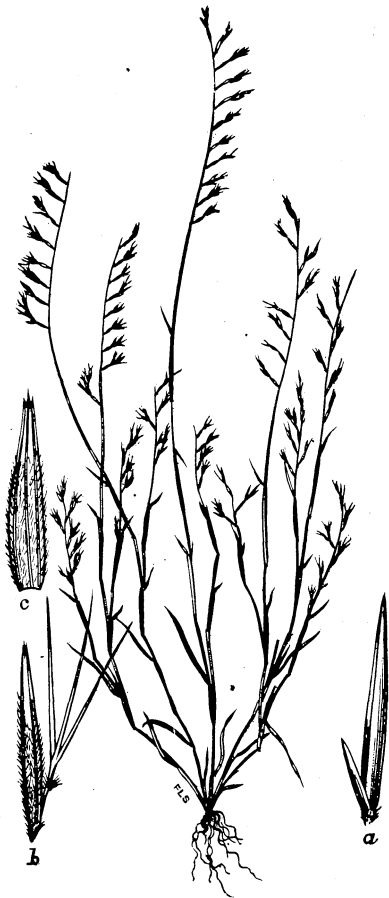


FIG. 196. *BOUTELOUA ARISTIDOIDES* (H. B. K.) Thurb. in S. Wats. Bot. Calif. 2: 291. 1880. (*Dinebra aristidoides* H. B. K. Nov. Gen. et Sp. Pl. 1: 171. 1815.) SIX-WEEKS MESQUIT.—A slender, densely tufted and much branched annual (?) 1-3.5 dm. (4'-14') high, with short, narrow leaves, and three to twelve very narrow and few- (sometimes only one-) flowered spikes 1-1.5 cm. ($\frac{1}{2}$ "- $\frac{3}{4}$ " long. Sheaths short, striate, smooth, except for a few scattered hairs near the apex; leaf-blades very narrow, erect, 4-10 cm. ($1\frac{1}{4}$ "-4' long. Spikelets 5-7 mm. ($2\frac{1}{4}$ "- $3\frac{1}{4}$ " long; the second glume (a) twice as long as the first; flowering glume (b, c) pubescent, terminating in three short awnlike teeth; pedicel of rudiment slightly bearded, as shown by (b), 3-5 mm. ($1\frac{1}{2}$ "- $2\frac{1}{4}$ " long.—Texas to southern California. (Mexico and Lower California.) August to September.

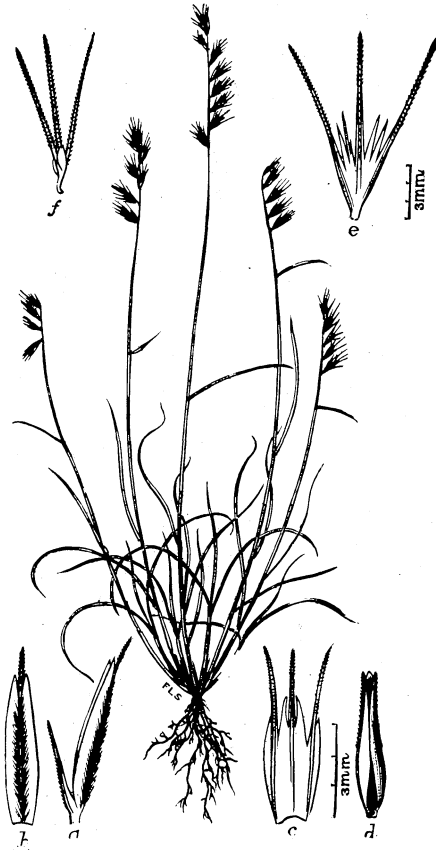


FIG. 197. *BOUTELOUA TEXANA* S. Wats. Proc. Am. Acad. 18: 196. 1883. TEXAN GRAMA.—A densely caespitose, usually glabrous perennial 2-3 dm. (8'-12') high, with narrow, flat leaves, and two to ten short, many-awned spikes, approximate on the common rachis. Leaves narrow, usually involute above. Spikelets about 6 mm. (3") long; second glume (a, b) slightly longer than the perfect floret, pubescent; flowering glume (c) with two slender lobes and three divergent awns which are shorter than the glume. Palea (d) obtuse. Rudimentary florets two (e, f) each with three to five awns 4-6 mm. (2"-3") long and with more or less developed glumes.—Dry soil, Texas and Indian Territory to Arkansas. March-April.



FIG. 198. **BOUTELOUA HAVARDI** Vasey in S. Wats. Proc. Am. Acad. 18: 179. 1883. **HAVARD'S GRAMA**.—A perennial, with strong rhizomes, upright culms 2–4 dm. (8'–16') high, and four to six short, silky-villous spikes (a), approximate on the common rachis. Sheaths short, loose, striate, the upper ones longer; leaf-blades concave, rigid, the lower ones crowded, scabrous on the margins and beneath, ciliate with short, scattered hairs. Spikelets 6 mm. (3") long, pubescent throughout; second empty glume (b) three times as long as the first; flowering glumes (c, d), 3-toothed, awnless or short awned; awns of rudiment (e) 5–10 mm. (2½"–5") mm. long, the middle one wing-margined.—Sandy plains, rocky hills, canyons, about springs, etc., Texas to Arizona. (Northern Mexico.) April to September.



FIG. 199. *BOUTELOUA ERIOPODA* Torr. Pac. R. R. Rept. 4⁵: 155. 1857. WOOLLY FOOT.—A slender, branching, and somewhat wiry perennial with woolly-jointed stems 1–6 dm. ($\frac{1}{4}$ °–2°) long, with three to six slender, spreading, and rather loosely flowered spikes 1.5–2.5 cm. ($\frac{1}{4}$ '–2') long. Culms weak, often decumbent, woolly-pubescent below; sheaths shorter than the internodes; leaf-blades narrow, 5–8 cm. (2'–3') long, 2–4 mm. (1''–2'') wide. Spikelets (a) 6–7 mm. (3''–3 $\frac{1}{4}$ '') long; second glume acute, twice as long as the first; middle awn of floral glume (c) twice as long as the lateral ones; rudiment (b) with few short hairs and three equal awns about 6 mm. (3'') long.—Dry, gravelly soil, Texas to Arizona. (Northern Mexico.) August, September.

A valuable grass for grazing, distinguished from the other species of *Bouteloua* by its woolly stems.



FIG. 200. *BOUTELOUA RAMOSA* Scribn. in Vasey, U. S. Dept. Agr. Div. Bot. Bul. 12¹: 44. pl. 44. 1890. WIRY GRAMA.—An erect or ascending perennial, with branching and many-jointed culms 3–4.5 dm (1° – $1\frac{1}{2}^{\circ}$) high, short, narrow, spreading leaves, and one to three spreading and more or less arcuate spikes 1–3 cm. ($\frac{1}{2}$ '– $1\frac{1}{4}$ ') long. Sheaths smooth, striate, with few long hairs at the apex; leaf-blades narrow, attenuate, 2–5 cm. ($1'$ – $2'$) long. Spikelets 4 mm. ($2''$) long with one perfect and one imperfect flower; empty glumes (*a*) smooth, acute, the first less than one-half as long as the second which is about 4 mm. ($2''$) long; flowering glumes (*b*, *b'*) exceeding 4 mm. ($2''$) in length, lanceolate, clothed on the back with long white hairs, 3-awned at the apex. Palea (*c*) 2-toothed, smooth. Rudiment (*d*) consisting of three awns with two or three imperfect glumes at their base on a short pedicel, which is densely tufted at the apex.—In canyons, mountains of southwestern Texas. (Northern Mexico.) August, September.

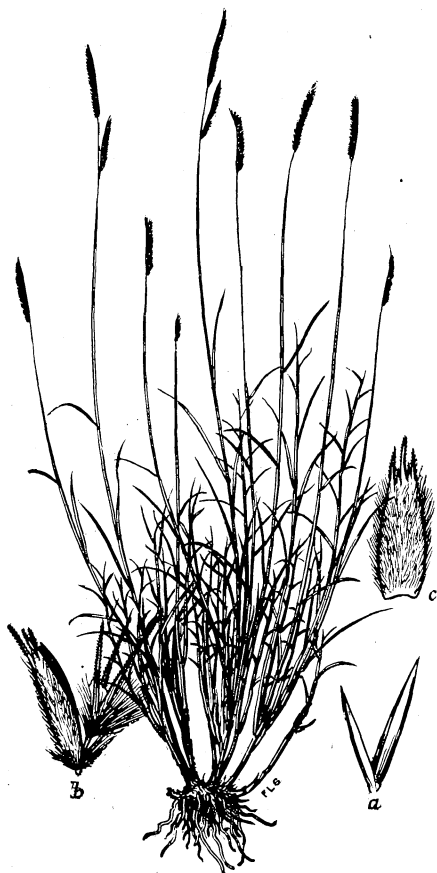


FIG. 201. **BOUTELOUA BREVISETA** Vasey, Contr. U. S. Nat. Herb. 1:58. 1890. **SHORT-AWNED GRAMA**.—An erect, somewhat wiry and densely caespitose perennial 2.5–3.5 dm. (10'–14') high, the lower internodes covered with thin, white bloom. Sheaths exceeding the internodes; leaves distichous, involute, rigid, 2–5 cm. (1'–2') long. Spikes one to three, erect, or somewhat divergent, about 2 cm. (1') long. Spikelets 3–4 mm. ($1\frac{1}{4}$ "–2") long; empty glumes (*a*) glabrous, the second one very acute, slightly shorter than the floret; flowering glume (*c*) pubescent, its awns about 1 mm. ($\frac{1}{4}$ " long; rudiment (*b*) bearded, its awns about 2 mm. (1") long.—Southwestern Texas. September.



FIG. 202. **BOUTELOUA VESTITA** (S. Wats.) Scribn. Contr. U. S. Nat. Herb. 2: 531. 1894. (*B. polystachya vestita* S. Wats. Proc. Am. Acad. 18: 177. 1883.) **HAIRY GRAMA**.—A tufted annual, with erect or ascending slender culms 3–6 dm. (1° – 2°) high, with short, flat leaves and two to eight ascending, many-flowered, hairy spikes about 2 cm. ($1'$) long. Leaves mostly flat, thinly pubescent. Spikelets 3.5–4.5 mm. ($1\frac{1}{4}''$ – $2\frac{1}{4}''$) long; empty glumes (*a*) unequal, the first one-half as long as the awn-pointed second one, which slightly exceeds the floret; flowering glume (*b*) thinly pubescent below, the inner lobes the larger, minutely ciliate; awns from the sinuses equaling or slightly exceeding the glume. Palea (*c*) four-lobed, short-awned. Rudiment (*d*) pilose-tufted, bearing three awns equaling those of the flowering glume.—Sandy banks of streams and “benches” on mountain sides, western Texas to southern Arizona. (Mexico.) September, October.



FIG. 203. **BOUTELOUA ROTHROCKII** Vasey, U. S. Dept. Agr. Spec. Rept. 63:33. 1883. (*B. polystachya major*, Vasey Rept. Wheeler's Surv. 6:287. 1878.) **ROTHROCK'S GRAMA**.—A densely caespitose perennial, with erect, simple, or sparingly branched leafy culms 3–6 dm. (1° – 2°) high, and five to nine more or less spreading, densely flowered spikes 2–3 cm. ($1'$ – $1\frac{1}{4}'$) long. Leaves mostly plane, 5–10 cm. ($2'$ – $4'$) long, thinly pubescent near the base. Spikelets 3–4 mm. ($1\frac{1}{4}''$ – $2''$) long; empty glumes (*a*) unequal, the second (*b*) prominently mucronate between the unequal lobes, much exceeding the first, but shorter than the floret; flowering glume (*c*, *d*) deeply 4-lobed, lobes ciliate, nearly equal, the awns equaling or exceeding the glume; teeth of the palea (*e*, *e'*) ciliate, its awns shorter than those of the glume; pedicel of the rudiment (*f*) villous-tufted, the awns usually longer than those of the flowering glume.—Sandy plains, mesas, and foothills, Arizona. (Mexico.) August, September.



FIG. 204. *BOUTELOUA OLIGOSTACHYA* (Nutt.) Torr. in A. Gray, Man. Bot. ed. 2, 553. 1856. (*Atheropogon oligostachyus* Nutt. Gen. 1: 78. 1818.) BLUE GRAMA.—A slender perennial 2-8 dm. ($\frac{1}{2}$ °-2°) high, with one to five remote, pectinately many-flowered, usually spreading spikes 2.5-5 cm. (1'-2') long. Sheaths shorter than the internodes; leaves short, narrow, attenuate. Spikelets about 6 mm. ($\frac{3}{8}$ ") long; empty glumes (*a*) awn-pointed, the first one-half to two-thirds as long as the second, which is about 6 mm. ($\frac{3}{8}$ ") long; flowering glume (*b*) lanceolate, 6 mm. ($\frac{3}{8}$ ") long, including the awns, hairy on the back, lobed to, or nearly to the middle; rudiment reduced to three equal awns with one or two imperfect glumes at the base, on a short pedicel having a tuft of white hairs at the top.—Wisconsin to Montana, north to Manitoba and Alberta, south to Texas, Arizona, and southern California; also at Tampa, Florida. (Mexico.) June to October.

One of the most abundant and most valued of the grama grasses; no other grass withstands the trampling of stock better, and it is unsurpassed for grazing purposes.

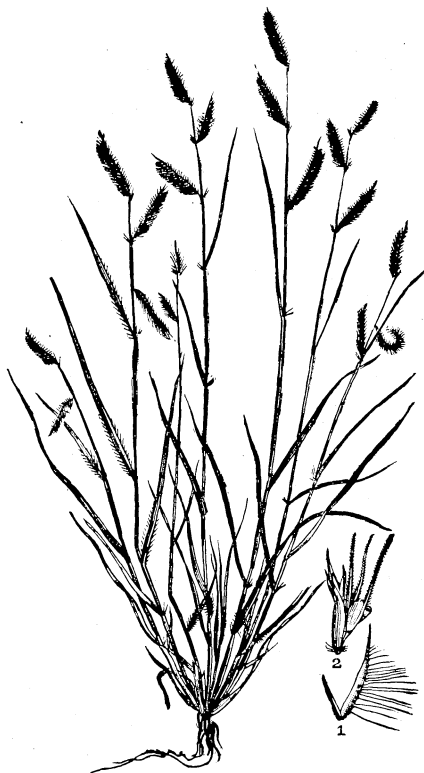


FIG. 205. **BOUTELOUA HIRSUTA** Lag. Varied. Cienc. Lit. Art. 2:141. 1805. (*Chondrostium hirtum* H. B. K. Nov. Gen. et Sp. Pl. 1:176. t. 59. 1815.) **BRISTLY MESQUIT**.—A caespitose perennial 1.5–4 dm. (6'–16') high, with erect or ascending culms, flat leaves, and one to three more or less spreading, densely flowered spikes 2–4 cm. (1'–2') long. Leaves usually short, 2–10 cm. (1'–4') long. Spikelets numerous, 5–6 mm. (2¼"–3") long; empty glumes (1) unequal, the first one smooth, 2 mm. (1") long, the second about 5 mm. (2¼") long with a row of dark or black glands on either side of the midnerve, each one emitting a long hair; flowering glume (2) nearly smooth, 3-lobed, each lobe terminating in a short awn; rudiment on a short pedicel, consisting of three awns and three imperfect glumes.—Dry prairies and sandy plains, Illinois and Wisconsin to South Dakota, Nevada, Arizona, and Texas, and (?) southern Florida. (Mexico and Lower California.) July to September.

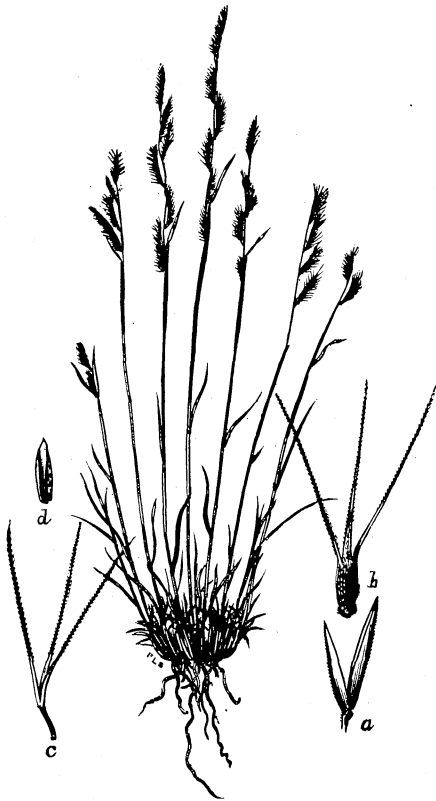


FIG. 206. **BOUTELOUA TRIFIDA** Thurb. in S. Wats. Proc. Am. Acad. **18**: 177. 1883. **SMALL GRAMA**.—A delicate perennial 1-3 dm. (4'-12') high, with short, narrow leaves, and three to seven ascending spikes usually about 2 cm. (1') long. Sheaths shorter than the internodes; leaves small, mostly radical, 2-8 cm. (1'-3') long, smooth or sparingly pilose. Spikelets about 3 mm. (1¼") long; empty glumes (a) slightly unequal, the first one-fourth shorter than the second; flowering glume (b) less than 2 mm. (1") long, dividing above into three long-awned lobes 4-5 mm. (2"-2¼") long. Palea (d) shorter than the glume, 2-toothed. Rudiment (c) reduced to three slender awns, slightly enlarged toward the base, on a short, smooth pedicel.—Mesas and sandy plains, Texas to Arizona. (Northern Mexico.) May to October.



FIG. 207. **BOUTELOUA BURKII** Scribn. in S. Wats. Proc. Am. Acad. 18: 179. 1883. **BURK'S GRAMA**.—A slender, tufted perennial 15-20 cm. (6'-8') high, with short, spreading leaves and slender, horizontal spikes 1-2 cm. ($\frac{1}{4}$ '-1') long. Sheaths shorter than the internodes; leaf-blades mostly crowded at the base, 1-3 cm. ($\frac{1}{4}$ '-1 $\frac{1}{4}$ ') long, 1 mm. ($\frac{1}{8}$ ") wide. Spikelets, about 4 mm. long; empty glumes (a) subequal, 1-nerved, smooth; flowering glume (b) exclusive of the three equal awns less than 2 mm. (1") long, pilose on back and margins; pedicel of rudiment (d) 1 mm. ($\frac{1}{8}$ ") long, bearing three equal scabrous awns 5 mm. (2 $\frac{1}{4}$ ") long.—Sandy plains and dry mesas, western Texas. (Northern Mexico). April to July.

Related to *Bouteloua trifida*, which differs from this species in its larger size, narrower, unequal empty glumes, and smooth flowering glume.

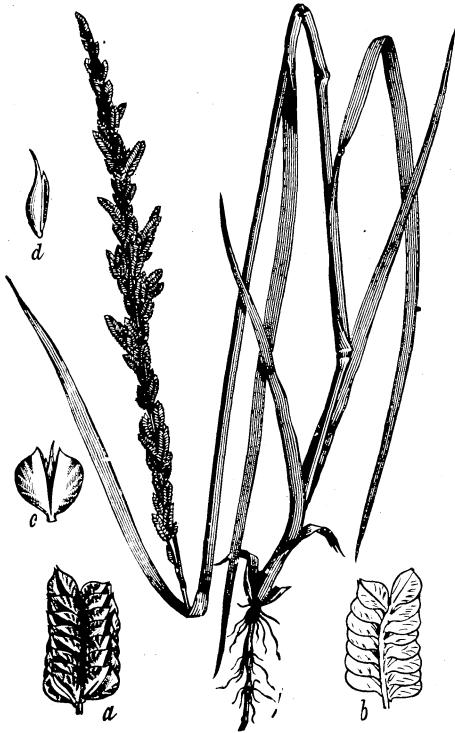


FIG. 208. **BECKMANNIA ERUCAEFORMIS** (Linn.) Host, Gram. 3: 5. 1805. (*Phalaris erucaeformis* Linn. Sp. Pl. 55. 1753.) SLOUGH-GRASS.—A stout, erect, subaquatic perennial 3-12 dm. (1° - 4°) high, with narrow panicles composed of many densely flowered one-sided spikes. Sheaths longer than the internodes, loose; ligule 4-8 mm. ($2''$ - $4''$) long; leaf-blades 7-22 cm. ($3'$ - $9'$) long, 4-8 mm. ($2''$ - $4''$) wide, scabrous. Spikelets (c) 2-3 mm. ($1''$ - $1\frac{1}{2}''$) long, 1 to 2 flowered, closely imbricated in two rows on one side of the rachis (a, b); empty glumes (c) smooth, saccate, obtuse or abruptly acute; flowering glumes (d) acute, the lower generally awn-pointed.—In sloughs and along the banks of rivers and streams, western Ontario to Iowa, California, British Columbia, and Alaska. (Europe and Asia.) June to September.

This grass is often abundant in pastures of the Northwest and when young it affords a large amount of forage readily eaten by stock. It is especially adapted to irrigated alkaline soils.



FIG. 209. **ELEUSINE INDICA** (Linn.) Gaertn. Fruct. et Sem. 1: 8. 1788. (*Cynosurus indicus* Linn. Sp. Pl. 72. 1753.) GOOSE or YARD-GRASS.—A coarse, tufted annual, with erect or spreading stems 1.5–6 dm. ($\frac{1}{2}$ °–2°) high, and two to five digitate spikes 5–7 cm. (2'–3') long. Sheaths loose, overlapping, glabrous or sometimes sparingly villous; leaf-blades 8–30 cm. (3'–12') long, 2–6 mm. (1''–3'') wide, smooth or scabrous. Spikelets (*a*, *b*) 3 to 6 flowered, 3–4 mm. (1½''–2'') long; empty glumes acute, the first 1-nerved, the second 7-nerved; flowering glumes (*c*) 3 to 5 nerved; seed (*d*) finely striate and loosely inclosed in a thin pericarp.—Waste or cultivated ground, New Jersey to Ohio and Kansas, south to Florida and Texas. (Widely distributed in tropical and subtropical countries.) June to October.

This grass is considered by some authorities as being of considerable value in the South for grazing and hay, but is more generally regarded as a troublesome weed.



FIG. 210. **DACTYLOCTENIUM ÆGYPTIUM** (Linn.) Willd. (*Cynosurus ægyptius* Linn. Sp. Pl. 72. 1753; *Eleusine ægyptica* Desf. Fl. Atl. 1: 85. 1798; *D. ægyptiacum* Willd. Enum. 1029. 1809.) CROWNFOOT-GRASS.—A low, tufted or creeping grass, with ascending flowering stems rarely 3 dm. (1^o) high, and three to five digitate spikes 2-5 cm. (1'-2') long. Sheaths loose, overlapping, glabrous; leaf-blades 15 cm. (6') long or less, 2-6 mm. (1"-3") wide, smooth or scabrous, sometimes pubescent. Spikelets (a) in pairs, 3 to 5 flowered; glumes compressed, scabrous on the keel, the second (d) awned; the flowering glumes (b) acuminate-pointed.—Waste or cultivated ground, southern New York to Illinois, south to Florida and Texas, west to California. (Widely distributed in tropical and subtropical regions of both hemispheres.) May to December.

This species resembles *Eleusine indica*, from which it is at once distinguished by its having the terminal spikes shorter, and each tipped with a sharp prolongation of the axis. It is sometimes cut for hay and in eastern countries the seeds are used as food in times of famine. In portions of Africa the seeds are used for medicinal purposes.

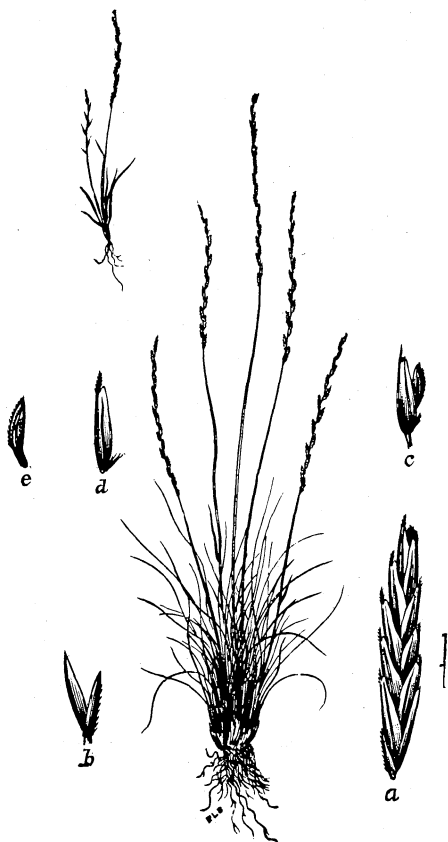


FIG. 211. **LEPTOCHLOA SPICATA** (Nees) Scribn. Proc. Acad. Nat. Sci. Phila. 1891: 304. 1891. (*Bromus spicatus* Nees, Agrost. Bras. 471. 1829; *Diplachne simplex* Doell in Mart. Fl. Bras. 2³: 97. 1878; *D. spicata* Doell, l. c. 159. t. 28. f. 2. 1878; *D. reverchoni* Vasey, Bul. Torr. Bot. Club, 13: 118. 1886.)—A low, densely caespitose perennial (?) with numerous setaceous basal leaves and a slender scape-like culm 6-15 cm. (2½'-6') high. Leaves mostly basal, numerous, narrow, involute, 3-5 cm. (1'-2') long. Panicle 5-10 cm. (2'-4') long. Spikelets (a) about 6 mm. (¾") long, 8 to 10 flowered; empty glumes (b) unequal, the second obtuse, one-third longer than the first; flowering glume (c, d) ovate, short-awned between the two lobes at the apex, pubescent at the base. The palea is shown by e.—Granite rocks, central Texas. (Mexico and Brazil.) May to July.



FIG. 212. **LEPTOCHLOA FASCICULARIS** (Lam.) A. Gray, Man. Bot. 588. 1848. *Festuca fascicularis* Lam. Tabl. Encycl. 1: 189. 1791; *Diplachne fascicularis* Beauv. Agrost. 160. 1812.) **CLUSTERED SALT-GRASS**.—An erect, ascending, or more or less diffusely spreading, caespitose, much-branched annual 5-6 dm. ($1\frac{1}{4}$ '-2') high, with numerous, erect, crowded spikes 6-8 cm. ($2\frac{1}{4}$ '-3 $\frac{1}{4}$ ') long. Sheaths loose, the upper one usually inclosing the lower part of the panicle; ligule 2-4 mm. ($1''$ -2'') long; leaf-blades 8-30 cm. (3'-12') long, 2-6 mm. ($1''$ -3'') wide. Spikelets (a) 5 to 10 flowered, 6-10 mm. ($3''$ -5'') long; empty glumes (b) scabrous on the keel, unequal; flowering glume (c) with a prominent awn, 2-toothed or sometimes 4-toothed at the apex, pubescent near the base. The palea is shown by d.—Salt marshes along the coast, Rhode Island to Texas; saline soil in the interior, western New York to South Dakota, Nevada, New Mexico, and Texas. (Mexico and West Indies.) July to September.

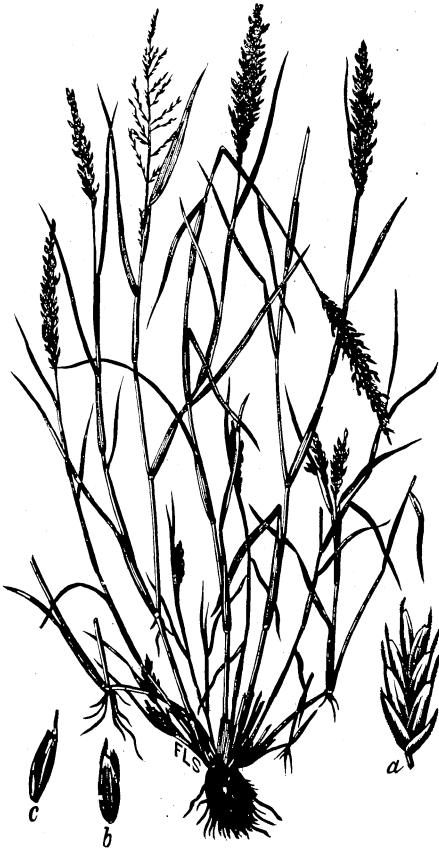


FIG. 213. **LEPTOCHLOA VISCIDA** (Scribn.) Beal, Grasses N. A. 2: 434. 1896. (*Diplachne viscida* Scribn. Bul. Torr. Bot. Club, 10: 30. 1883.) VISCID LEPTOCHLOA.—A densely caespitose and diffusely branched perennial (?) 0.5–6 dm. (2'–24') high, with acute, flat leaves and narrow, densely flowered panicles 5–8 cm. (2'–3') long, composed of eight to twelve erect spikes. Spikelets (a) about 4 mm. (1/4") long, 4 to 6 flowered; empty glumes ovate, acute, hyaline, 2 mm. (1/8") long, scabrous on the single nerve, the second slightly longer than the first; flowering glumes (b, c) two-lobed, the lobes obtuse, bearing an awn from the cleft 1 mm. (1/16") long.—Wet, clayey soil, New Mexico and Arizona. (Mexico and Lower California.) June to September.



FIG. 214. **LEPTOCHLOA IMBRICATA** Thurb. in S. Wats. Bot. Calif. 2 : 293. 1880. (*Diplachne imbricata* Scribn. Bul. Torr. Bot. Club, 10 : 30. 1883.)—A rather stout, erect or ascending perennial 3-9 dm. (1° - 3°) high, with smooth, usually glaucous culms, narrow, flat leaves, and numerous crowded, erect or ascending spikes 4-6 cm. ($1\frac{1}{2}'$ - $2\frac{1}{4}'$) long. Spikelets (a, b) 6-8 mm. ($3''$ - $4''$) long, 6 to 10 flowered, imbricate; empty glumes (c) unequal, the first acute, the second obtuse, mucronate, about 2 mm. ($1''$) long; flowering glumes (d, e) truncately obtuse, with two short, blunt teeth at the apex, the midnerve terminating in a short mucro.—Texas to southern California. (Mexico and Lower California.) August to November.



FIG. 215. **LEPTOCHLOA SCABRA** Nees, Agrost. Bras. 435. 1829. (*L. langloisii* Vasey, Bul. Torr. Bot. Club, 12:7. 1885.) ROUGH LEPTOCHLOA.—A stout annual 6-12 dm. (2° - 4°) high, with flat leaves and very many, crowded, slender spikes in terminal panicles 3 dm. (1°) long. Sheaths loose; leaf-blades about 3 dm. (1°) long, 6-8 mm. ($3''$ - $4''$) wide, somewhat scabrous. Spikelets (a, b) loosely imbricate, 3 to 4 flowered, 4 mm. ($2''$) long; empty glumes unequal, ovate, acute, scabrous on the keel, the first about 1 mm. ($\frac{1}{2}''$) long, the second 2 mm. ($1''$) long; flowering glumes (c) mucronate, 3-nerved, slightly pubescent on the keel, ciliate on the lateral nerves below. Palea slightly shorter than the glume, 2-toothed.—Ditches and fields, Louisiana. (Brazil.) September.

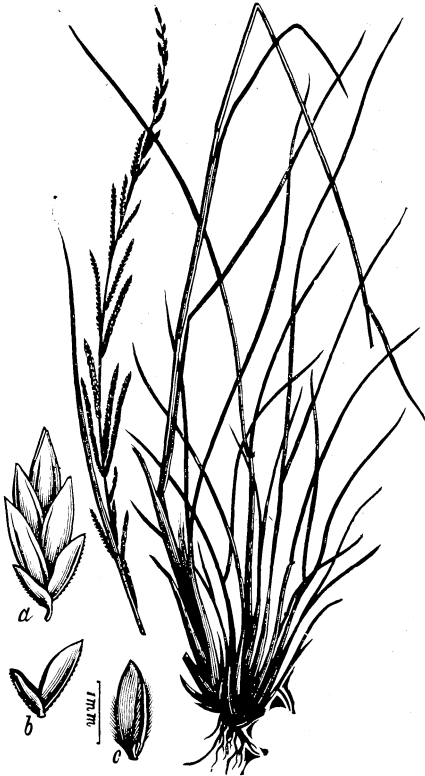


FIG. 216. **LEPTOCHLOA NEALLEYI** Vasey, Bul. Torr. Bot. Club, 12:7. 1885. (*L. stricta* Fourn. Mex. Pl. 2:147. 1881, not Trin 1841.) NEALLEY'S LEPTOCHLOA.—A slender or rather stout perennial, with erect or ascending culms 4.5–12 dm. ($1\frac{1}{4}$ –4°) high, and narrow, elongated panicles of many erect or ascending spikes. Sheaths smooth, loose; leaf-blades 15–25 cm. (6'–10') long, 4–6 mm. (2"–3") wide. Spikelets (a) 2–3 mm. ($1''$ – $1\frac{1}{4}''$) long, 2 to 5 flowered; empty glumes (b) unequal, ovate, acute, the first one-half as long as the second; flowering glume (c) subobtusate or emarginate, pubescent on margins and keel. Palea narrow, equaling the glume, finely pubescent on the keels.—Western Texas. (Mexico.) April to June.



FIG. 217. **LEPTOCHLOA DUBIA** (H. B. K.) Nees, Syllog. Ratisb. 1:4. 1824. (*Chloris dubia* H. B. K. Nov. Gen. et Sp. Pl. 1:169. 1815; *Diplachne dubia* Scribn. Bul. Torr. Bot. Club, 10:30. 1883.)—A rather stout and apparently perennial species 3–9 dm. (1° – 3°) high, with usually eight to ten approximate spreading spikes 6–8 cm. ($2\frac{1}{4}'$ – $3\frac{1}{4}'$) long. Leaves 2–4 dm. ($8'$ – $16'$) long. Spikelets (a) 5–7 mm. ($2\frac{1}{4}''$ – $3\frac{1}{4}''$) long, 2 to 5 flowered; empty glumes (b) acute, slightly unequal; flowering glumes (c) emarginate, mucronate between the broad, obtuse lobes, smooth, except on the slightly ciliate margins. The palea is shown by d.—Southern Florida, Texas to Arizona, and southward into Mexico. April to September.

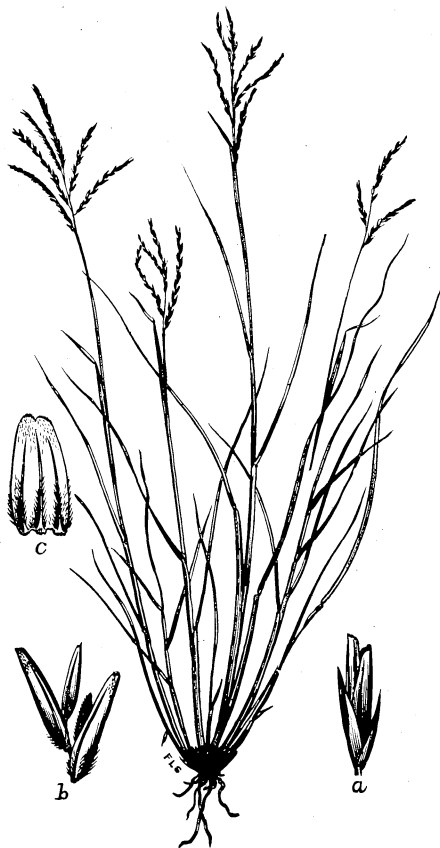


FIG. 218. **LEPTOCHLOA PRINGLEI** Beal, Grasses N. A. 2: 436. 1896. (*Diplachne pringlei* Vasey, l. c.)—A rather slender perennial 2.5–3.5 dm. (10'–14') high, with narrow leaves and four to six spikes 2.5–5 cm. (1'–2') long, approximate near the summit of the culm. Spikelets (a) 2 to 3 flowered; empty glumes lanceolate, 1-nerved, the first 2.5 mm. ($1\frac{1}{4}$ ") long, the second about 3 mm. ($1\frac{1}{4}$ ") long; flowering glumes (b, c) 4 mm. (2") truncate or emarginate, sparingly hairy on the nerves near the base.—Arizona. April, May.



FIG. 219. **LEPTOCHLOA MUCRONATA** (Michx.) Kunth, Rev. Gram. 1 : 91. 1835. (*Eleusine mucronata* Michx. Fl. Bor. Am. 1 : 65. 1803.) FEATHER-GRASS.—A more or less branching annual 6–12 dm. (2° – 4°) high, with rather broad, flat leaves and long terminal panicles of many slender spikes 8–10 cm. (3'–4') long. Sheaths shorter than the internodes, glabrous; ligule short, lacerate; leaf-blades 5–20 cm. (2'–8') long, 2–6 mm. (1"–3") wide, scabrous. Spikelets about 2 mm. (1") long, 2 to 4 flowered; empty glumes (a) very acute, scabrous on the keel; floral glumes (b) obtuse or slightly emarginate, ciliate on the nerves.—A weed in cultivated and waste grounds, Virginia, Illinois, south to Texas and California. (Northern Mexico and Cuba.) June to October.



FIG. 220. **BULBILIS DACTYLOIDES** (Nutt.) Raf. Amer. Month. Mag. 4:190. 1819. (*Sesleria dactyloides* Nutt. Gen. 1:65. 1818; *Buchloë dactyloides* Engelm. Trans. Acad. Sci. St. Louis 1:432. t. 14. 1859.) **BUFFALO-GRASS**.—A low, fine-leaved, and extensively creeping perennial, rarely more than 1-1.5 dm. (4'-6') high; staminate spikes (*b, b'*) 2 or 3, approximate; spikelets (*c*) 4-5 mm. (2"-2½") long, 2 to 3 flowered, the empty glumes 1-nerved, the flowering glumes 3-nerved; pistillate spikelets (*a'*) ovoid, the outer glume indurated. Similar to Bermuda grass in habit of growth.—Dry prairies and river bottoms, Minnesota and South Dakota (ascends to 1,650 m. (4,950') in Black Hills), to Arkansas, southern Texas, and Colorado. (Mexico.) March to August.

This species is the true buffalo-grass of the Great Plains region, and is greatly relished by all kinds of stock. It covers large areas with a close mat of fine-leaved herbage, and as winter forage plant it is without an equal.



FIG. 221. **PAPPOPHORUM WRIGHTII** S. Wats. Proc. Am. Acad. 18: 128. 1883. (*P. boreale* Torr. Pac. R. R. Rept. 4⁵: 155. 1857, not Griseb. 1853.) **PURPLE-GRASS.**—A slender, branching, and apparently annual species 2–4 dm. (8'–16') high, with narrow, involute leaves and densely flowered, spike-like, lead-colored or purplish panicles 1–7 cm. ($\frac{1}{2}$ '–3') long. Sheaths shorter than the internodes, loose; leaf-blades filiform-involute, 2–10 mm. (1'–4') long. Spikelets (a) about 3-flowered, 4–6 mm. (2''–3'') long, 2 to 3 flowered; empty glumes lanceolate, acute, 5-nerved, sparingly pubescent; flowering glume (b, c) with nine nerves, terminating in ciliate awns, nearly twice as long as the glume; sterile glume similar but smaller. The palea is shown by d.—Rocky hills, canyons, and open plains, western Texas to Arizona. (Northern Mexico.) July to September.



FIG. 222. **PAPPOPHORUM APERTUM** Scribn. Bul. Torr. Bot. Club, 9 : 148. 1882.—A caespitose perennial 3-9 dm. (1° - 3°) high, with long, narrow, mostly involute leaves and narrow, pale, or often straw-colored panicles 15-20 cm. (6'-8') long. Sheaths about equaling the internodes, slightly hispid; ligule a rather conspicuous hairy ring, 3-4 mm. ($1\frac{1}{4}$ "-2") long; leaf-blades 10-25 cm. (4'-10') long, about 4 mm. (2") wide. Spikelets (a) 3 to 5 flowered, 6-8 mm. (3 "-4") long; empty glumes unequal, acute, hyaline, 1-nerved; flowering glume (b, c) 7-nerved, pubescent, the nerves terminating in awns about the length of the glume, with nearly as many aristiform lobes in the intervals. Palea (d) 3 mm. ($1\frac{1}{4}$ ") long, lanceolate, 2-keeled.—Valleys, western Texas to Arizona and Mexico. June.



FIG. 223. **COTTEA PAPPOPHOROIDES** Kunth, Rev. Gram. 1: 281. t. 52. 1835. COTTA-GRASS.—An erect, branching perennial 3-6 dm. (1° - 2°) high, with narrow, flat, pilose leaves and oblong, open panicles 9-18 cm. ($3\frac{1}{4}$ '-7') long, hoary-pubescent throughout; spikelets 6-8 mm. ($3''$ - $4''$) long, 2 to 6 flowered; empty glumes (a) nearly equal, 4 mm. ($2''$) long, pubescent, the first irregularly 3-toothed at the apex, the second acute or short-awned; flowering glumes (b, c) pubescent at base, 9 to 11 nerved, terminating in as many alternating mucronate and aristiform lobes. Palea (d) lanceolate, 2-nerved, pubescent on the nerves.—In canyons, western Texas to Arizona. (Mexico and South America.) August to October.

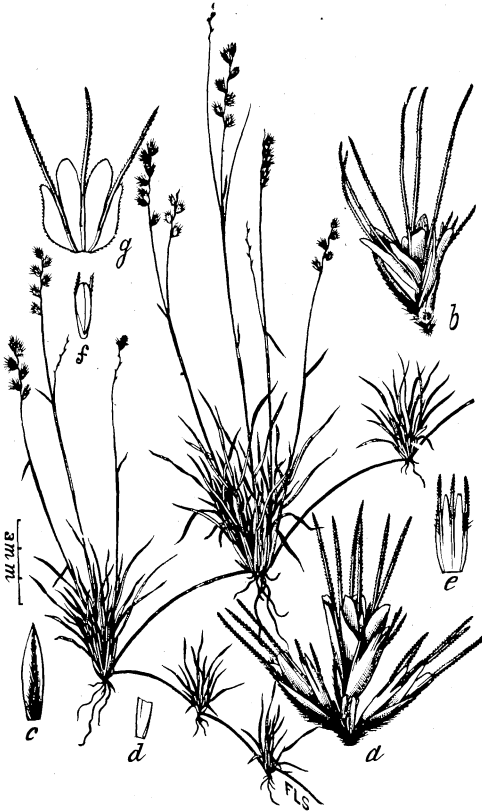


FIG. 224. *CATHESTECUM PROSTRATUM* Presl, Rel. Haenk. 1 : 295. t. 42. 1830. (*C. erectum* Vasey, Bul. Torr. Bot. Club, 11 : 37. 1884.)—An extensively creeping, slender perennial, with upright flowering branches 1-3 dm. (4'-12') high, narrow, flat leaves, and clustered spikelets in terminal of lateral racemes. Clusters (*a*) about 5 mm. ($\frac{1}{4}$ " long, of three, rarely four, 2-flowered spikelets (*b*); awns 1-4 mm. ($\frac{1}{4}$ "-2" long, empty glumes very unequal, the first (*d*) truncate about 1 mm. ($\frac{1}{4}$ " long, the second (*c*) lanceolate, 2-3 mm. ($1''$ - $1\frac{1}{4}''$) long; flowering glumes (*g*) 2 to 4-lobed with three nerves produced in short awns at the sinuses is shown by *f*.—Dry mesas and bluffs along the Rio Grande, western Texas. (Mexico.) July to October.

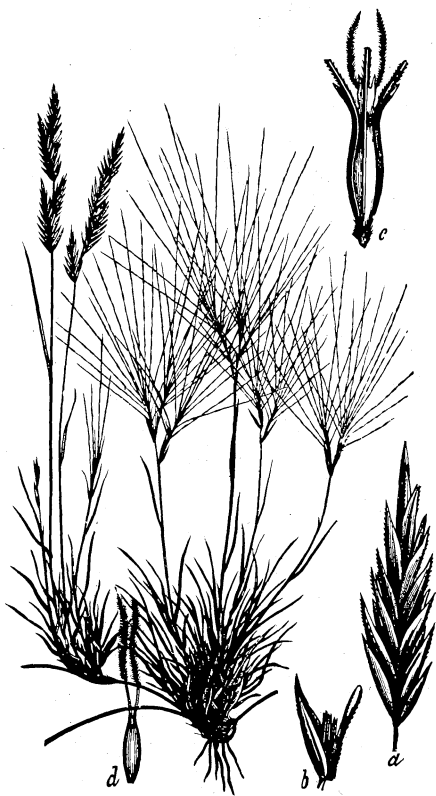


FIG. 225. **SCLEROPOGON BREVIFOLIUS** Philippi, Sert. Mendoc. 2: 48. 1871. (*Tricuspis monstrosa* Munro in Hemsl. Diagn. Pl. Nov. Mex. 56. 1880; *Lesourdia multiflora* and *L. karwinskyana* Fourn. Bul. Soc. Bot. Fr. 27: 102. 1880.)—A wiry, creeping perennial with densely tufted, upright, leafy branches 1-2.5 dm. (4'-10') high, and unisexual spikelets; the staminate spikelets (a) 15 to 30 flowered, 1-2 cm. ($\frac{1}{2}$ '-1') long, forming a short, close panicle; flowering glumes (b) acute, 5-7 mm. ($2\frac{1}{4}$ "-3 $\frac{1}{4}$ " long; pistillate spikelets forming an irregular panicle of three to seven few-flowered spikelets, each subtended by a narrow bract; empty glumes unequal, lanceolate; flowering glume (c) 8-10 mm. (4"-5") long, the three nerves terminating in slender, twisted awns 5-12 cm. (2'-5') long.—Dry mesas and canyons, Colorado to Texas, New Mexico, Arizona, and southward into Mexico and South America. May to October.



FIG. 226. **MONANTHOCHLOË LITTORALIS** Engelm. Trans. Acad. Sci. St. Louis 1 : 436. *tt.* 13, 14. *f.* 18-27. 1859. SALT CEDAR.—A creeping grass 1-2 dm. (4'-8') high, with hard, woody stems, and crowded, subulate, rigid leaves 2 cm. (1') long, or less. Spikelets sessile in the upper leaf axils (*a*), dioecious, 2-, rarely 3-flowered, 6-8 mm. (3"-4") long; empty glumes similar to the leaves; floral glumes membranaceous, obtuse, or denticulate.—Rocky shores and salt marshes along the coast, southern Florida, extreme southern Texas and southern California. (Lower California.) May, June.



FIG. 227. **MUNROA SQUARROSA** (Nutt.) Torr. Pac. R. R. Rept. 4⁵: 158. 1857. (*Crypsis squarrosa* Nutt. Gen. 1: 49. 1818.) FALSE BUFFALO-GRASS.—A low, diffusely much-branched annual 1-2 dm. (4'-8') high, with crowded and sharply pointed, rigid leaves 0.5-2.5 cm. ($\frac{1}{4}$ '-1 $\frac{1}{4}$ ') long. Spikelets (a) 3 to 5 flowered, sessile in leafy clusters at the nodes and ends of the branches; empty glumes (b) unequal, narrowly lanceolate, hyaline, 1-nerved, 2.5-3 mm. ($1\frac{1}{4}$ "-1 $\frac{1}{2}$ "') long; flowering glumes (c) becoming coriaceous, entire, or 2-toothed 4-5 mm. (2"-2 $\frac{1}{4}$ "') long, the midnerve excurrent into a short-awn.—Prairies and dry plains, South Dakota to Texas, west to Alberta, Montana, Colorado, and Arizona. June to October.

A low, tufted grass usually in dry sandy soil, not liked by cattle.



FIG. 228. *ORCUTTIA CALIFORNICA* Vasey, Bul. Torr. Bot. Club, 13: 219. 1886.—A low, much-branched, caespitose annual 0.5-1 dm. (2'-4') high, the numerous stems bearing 3 to 6 spikelets near the apex. Sheaths open, somewhat inflated, sparingly pubescent; leaf-blades plane 2 cm. (1') long or less. Spikelets (a, b) 12 to 20 flowered, 6-10 mm. (3"-5") long; empty glumes sparingly pubescent; 2-4 mm. (1"-2") long with usually three acute, 3-nerved lobes at [the apex; flowering glume (c) 3-5 mm. (1¼"-2¼") long, with 5 narrow, acute, 3-nerved lobes, the middle lobes the longer. Palea (d) 4-toothed at the apex, thin, 3-4 mm. (1¼"-2") long.—Southern and Lower California. April.



FIG. 229. **PHRAGMITES VULGARIS** (Lam.) B. S. P. Prel. Cat. N. Y. 69. 1888. (*P. communis* Trin. Fund. Agrost. 134. 1820; *Arundo vulgaris* Lam. Fl. Fr. 3: 615. 1778; *A. phragmites* L. Sp. Pl. 81. 1753.) **COMMON REED**.—A tall, stout, perennial grass 15-45 dm. (5° - 15°) high, with stout, creeping rootstocks, numerous, broad, attenuate-pointed leaves, and large ovoid-pyramidal, purplish, terminal panicles 15-30 cm. ($\frac{1}{3}$ - 1°) long or more. Spikelets (a) crowded on the ascending branches; empty glumes (b) unequal, the first 1-nerved, one-half to two-thirds as long as the 3-nerved second one; flowering glumes (c) 10-12 mm. ($5''$ - $6''$) long, 3-nerved, long-acuminate, equaling the hairs of the rachilla.—Margins of lakes and rivers and in brackish coast marshes, almost everywhere in the United States and southern British America. (Widely distributed in temperate regions of both hemispheres.) August to October.

This species is one of the largest of our native grasses and one of the most valuable for binding the banks of rivers subject to wash. The young shoots are readily eaten by cattle and the mature stems make the best of thatch.



FIG. 230. **TRIODIA ERAGROSTOIDES** Vasey & Scribn. Contr. U.S. Nat. Herb. 1 : 58. 1890. (*Sieglingia eragrostoides* Dewey, *ibid*, 2 : 539. 1894.)—An erect, leafy perennial 6-9 dm. (2° - 3°) high, with long, narrow leaves and open, small-flowered panicles 2-3 dm. (8'-12') long. Spikelets (a) 5-7 mm. ($2\frac{1}{4}$ "- $3\frac{1}{4}$ " long, 8 to 10 flowered; empty glumes (b) unequal, the first linear-lanceolate, 2 mm. ($1''$) long, the second broader and longer; flowering glumes (c, d) truncate or slightly 2-lobed, mucronate, pubescent on its three nerves below. Palea (e) truncate, minutely ciliate, scarcely 2 mm. ($1''$) long.—Rocky banks, etc., southern Texas, southern Florida. (Northeastern Mexico.) June to October.



FIG. 231. **TRIODIA TEXANA** S. Wats. Proc. Am. Acad. 18: 180. 1883.—A slender, wiry grass 3-6 dm. (1° - 2°) high, with very narrow leaves and loosely, few-flowered, nodding panicles 10-15 cm. (4'-6') long. Spikelets (a) 8-12 mm. (4"-6") long, 7 to 11 flowered, the rachilla very slender and flexuose; first glume broadly lanceolate, acute, about 3 mm. ($1\frac{1}{4}$ ") long, the second slightly longer; flowering glumes (b) slightly lacerate above, membranaceous, pubescent on the 3 nerves toward the base. Palea (c) broad at the base, narrowed above, obtuse, smooth.—Rich valley land, dry places, etc., Louisiana and Texas to Arizona. (Northern Mexico.) June to August.



FIG. 232. **TRIODIA AMBIGUA** (Ell.) Benth. in Vasey, U. S. Dept. Agr. Spec. Rept. **63**: 35. 1883. (*Poa ambigua* Ell. Sk. Bot. S. C. and Ga. **1**: 165. 1817; *Sieglingia ambigua* Kuntze, Rev. Gen. Pl. **2**: 789. 1891.)—An erect perennial 6–12 dm. (2° – 4°) high, with narrow, flat leaves and open, pyramidal panicles 10–20 cm. (4'–8') long. Spikelets (a) 4–6 mm. ($2''$ – $3''$) long, 5 to 8 flowered, usually purple; empty glumes slightly shorter than the lower flowering glumes (b) which is 3-nerved, the nerves somewhat excurrent and pubescent below the middle. Palea (c) equaling the glume.—Dry, open pine barrens near the coast, South Carolina to Texas. July to October.



FIG. 233. **TRIODIA ALBESCENS** Vasey, U. S. Dept. Agr. Div. Bot. Bul. 122: 33. pl. 33. 1891. (*Sieglingia albescens* Kuntze, Rev. Gen. Pl. 2: 789. 1891.)—A caespitose, erect perennial 4-7 dm. ($1\frac{1}{4}^{\circ}$ - $2\frac{1}{4}^{\circ}$) high, with narrow, flat leaves and densely flowered, spike-like panicles 9-15 cm. ($3\frac{1}{4}$ '-6') long. Spikelets (a) 4-6 mm. (2"-3") long, 8 to 10 flowered; empty glumes nearly equal, the second slightly larger, broadly ovate, acute, hyaline, 1-nerved, 3 mm. ($1\frac{1}{8}$ ") long; flowering glumes (b) rotund, somewhat emarginate, mucronate, hyaline, smooth or nearly so, the midnerve slightly if at all excurrent. Palea (c) broadly ovate, obtuse.—Texas. August to October.



FIG. 234. **TRIODIA NEALLEYI** Vasey, Bul. Torr. Bot. Club, 15: 49. 1888. (*Sieglingia nealleyi* Dewey, Contr. U. S. Nat. Herb. 2: 538. 1894.)—A slender, glaucous, caespitose perennial 3-6 dm. (1° - 2°) high, with flat or conduplicate leaves, and densely flowered, linear or ovoid panicles 4-5 cm. ($1\frac{1}{4}$ - $2'$) long. Spikelets (a) 6-8 mm. ($3''$ - $4''$) long, 5 to 8 flowered; first glume ovate, acute, smooth, about 4 mm. ($2''$) long, the second about 1 mm. ($\frac{1}{4}''$) longer; flowering glumes (b) truncate, translucent, profusely ciliate on the margins and ciliate on the back below, 2-lobed or cleft one-third to the base, the lobes equaled or exceeded by the intermediate awn. Palea (c) strongly arcuate, pubescent on the two prominent keels.—Canyons and ridges, southwestern Texas. September.



FIG. 235. **TRIODIA ACUMINATA** (Munro) Benth. in Vasey, U. S. Dept. Agr. Spec. Rept. **63** : 35. 1883. (*Tricuspis acuminata* Munro in A. Gray, Proc. Acad. Nat. Sci. Phila. **1862** : 335. 1862; *Sieglingia acuminata* Kuntze, Rev. Gen. Pl. **2** : 789. 1891.)—A slender, densely tufted perennial 1.5–2 dm. (6'–8') high with short leaves, and simple, dense, oblong panicles 1.5–3 cm. ($\frac{1}{2}$ '– $\frac{1}{4}$ ') long. Spikelets (a) 10–14 mm. (5''–7'') long; empty glumes (b) smooth, acuminate, the first 4–5 mm. (2''–2 $\frac{1}{4}$ '') long, the second slightly longer; flowering glumes (c) ovate, acuminate, 4–5 mm. (2''–2 $\frac{1}{4}$ '') long, pubescent on the three nerves at the base, the midnerve excurrent into a short slender awn. Palea (d) finely pubescent on the two prominent keels and at the base.—Poor, gravelly soil, hillsides, etc., Texas to Arizona, north to Colorado and Indian Territory. (Northern Mexico.) April to June.

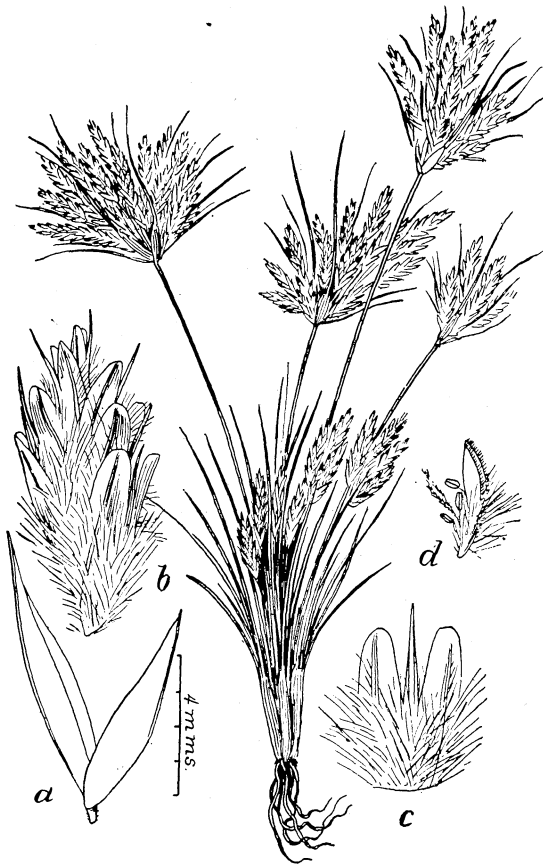


FIG. 236. **TRIODIA PULCHELLA** H. B. K. Nov. Gen. et Sp. Pl. 1:155. t. 47. 1815. (*Sieglingia pulchella* Kuntze, Rev. Gen. Pl. 2:789. 1891.)—A low, densely tufted and often creeping perennial 2-15 cm. (1'-6') high, with very narrow leaves and crowded spikelets in clusters of three to six, which are equaled or exceeded by the upper leaves. Spikelets white, 7 to 10 flowered, 5-8 mm. ($2\frac{1}{4}$ "-4") long; empty glumes (a) unequal, hyaline smooth, 1-nerved, the first 4-5 mm. ($2''$ - $2\frac{1}{2}''$) long, the second about 1 mm. ($\frac{1}{2}''$) longer; flowering glumes (b, c) 4 mm. ($2''$) long, cleft half way to the base or more, forming two long marginal lobes between which the midrib is extended as an awn longer than the lobes, profusely ciliate below. Palea (d) thin, pubescent below.—Western Texas to Nevada and southern California. (Northern Mexico.) February to June.



FIG. 237. **TRIPLASIS AMERICANA** Beauv. Agrost. 81. t. 16. f. 10. 1812. (*Sieglingia americana* Beal, Grasses N. A. 2: 466. 1896.)—A slender, cæspitose grass, with wiry culms 4-9 dm. (1° - 3°) high, rather short, narrow leaves, and few-flowered, simple panicles 3-10 cm. ($1'$ - $4'$) long. Nodes pubescent; leaf-blades scabrous, those of the culm 1-8 cm. ($\frac{1}{2}'$ - $3'$) long, basal ones 10-20 cm. ($4'$ - $8'$) long, 1.5-2 mm. ($\frac{3}{4}''$ - $1''$) wide. Spikelets (a) 2 to 5 flowered; empty glumes smooth, obtuse or lobed, 3.5-4 mm. ($1\frac{1}{2}''$ - $2''$) long; flowering glumes (b) about 5 mm. ($2\frac{1}{4}''$) long, cleft, bearing a pubescent awn 5-7 cm. ($2\frac{1}{4}''$ - $3\frac{1}{4}''$) long.—Dry, sandy soil near the coast, North Carolina to Mississippi. July to October.

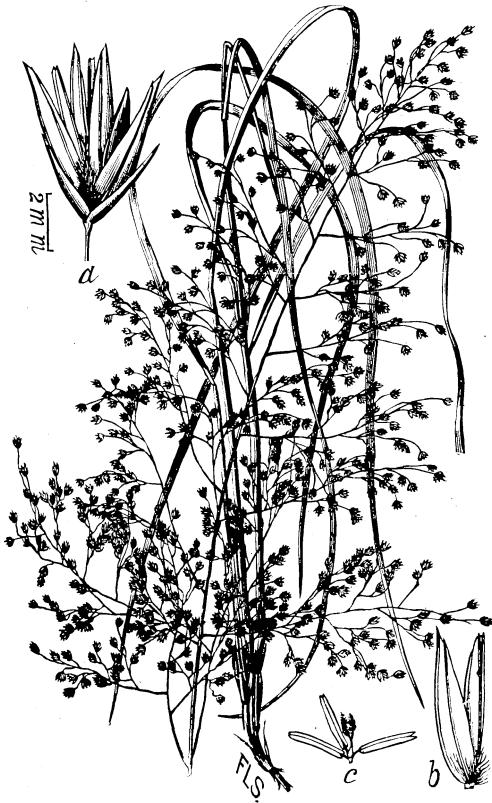


FIG. 238. **REDFIELDIA FLEXUOSA** (Thurb.) Vasey, Bul. Torr. Bot. Club, 14: 133. 1887. (*Grapphephorum* (?) *flexuosum* Thurb. Proc. Acad. Nat. Sci. Phila. 1863: 78. 1863.) **REDFIELD'S GRASS**.—A stout, native perennial 6–12 dm. (2°–4°) high, with very long, narrow leaves and diffuse, capillary panicles 25–60 cm. (10'–24') long. Sheaths glabrous, the lower ones short, crowded; leaf-blades involute 3–6 dm. (1°–2°) long, 2–4 mm. (1''–2'') wide. Spikelets (*a*) about 6 mm. (3'') long, 1 to 3 flowered; empty glumes glabrous, acute; flowering glumes (*b*) with a ring of hairs at the base, minutely scabrous, twice the length of the empty ones, the midnerve usually excurrent as a short point.—Sand hills and “blow-outs,” Kansas and Nebraska to Indian Territory, Colorado, and Wyoming. July, August.

This species has deeply penetrating and widely spreading underground stems or rhizomes, making it a valuable species for binding drifting sands. It is the characteristic grass of the sand-hill region of central Nebraska, and from its habit of growth in drifting sands it is often called “blow-out grass.”



FIG. 239. **DISSANTHELIUM CALIFORNICUM** (Nutt.) Benth. Hook. Icones Pl. III. 4: 56. t. 1375. 1881. (*Stenochloa californica* Nutt. Journ. Acad. Nat. Sci. Phila. II. 1: 189. 1848.)—A slender, glabrous, branching annual 1-3 dm. (4'-12') high, with short, narrow leaves and contracted, spike-like panicles 4-8 cm. (1½'-3') long. Sheaths smooth, rather loose; ligule obtuse, 2-3 mm. (1"-1½") long; leaf-blades 10-20 cm. (4'-8') long, 2-4 mm. (1"-2") wide. Spikelets 2 to 3 flowered, about 3 mm. (1¼") long; empty glumes (a) with scabrous keels, the first 1-nerved, the second 3-nerved; flowering glumes (b) ovate-acute, pubescent below.—Santa Catalina Island, southern California and Guadalupe Islands, Lower California. September.



FIG. 240. **ERAGROSTIS NEO-MEXICANA** Vasey, Contr. U. S. Nat. Herb. 2: 542. 1894. CRAB-GRASS (in New Mexico).—A rather stout, branching, and leafy annual 3-12 dm. (1° - 4°) high, with flat leaves and ample, diffuse panicles 20-40 cm. (8'-16') long. Spikelets (a, b) 5-8 mm. ($2\frac{1}{4}$ "-4") long, 9 to 15 flowered; flowering glumes hispid on the keel near the acute apex, one-fourth longer than the ciliate palea (c). Grain oblong, truncate at each end, slightly grooved.—Texas to southern California (ascends to 1,500 m. (4,500') in Arizona, August.

A valuable hay grass resembling Teff (*E. abyssinica*).



FIG. 241. **ERAGROSTIS PURSHII** Schrad. *Linnaea*, 12: 451. 1838. SOUTHERN SPEAR-GRASS.—An annual, 1-4 dm. (4'-16') high, with the erect or ascending culms diffusely branching near the base, and diffuse panicles of small, spreading spikelets. Spikelets (*a, b, c*) 5, to 10 flowered, 3-8 mm. ($1\frac{1}{4}$ "-4") long; empty glumes ovate, acute, minutely hispid on the back, the second nearly twice as large as the first; flowering glumes broadly ovate, convex, scarious, about 1.5 mm. ($\frac{1}{4}$ ") long. Palea minutely pubescent on its two nerves, persistent.—Sandy river banks, waste ground, etc., Maine and Ontario to South Dakota and California, south to Florida, Texas, and Arizona. (Mexico.) June to October.



FIG. 242. *ERAGROSTIS CURTIPEDICELLATA* Buckl. Proc. Acad. Nat. Sci. Phila. 1862: 97. 1862. SHORT-STALKED ERAGROSTIS.—A rather rigid, branching perennial 3-9 dm. (1° - 3°) high, with flat, spreading leaves and diffuse panicles 20-30 cm. ($8'$ - $12'$) long. Spikelets (*a*, *b*, *c*, *d*) 5- to 12-flowered, 3-6 mm. ($1\frac{1}{4}''$ - $3''$) long, on pedicels of less than their own length; empty glumes ovate, acute, carinate, thin, 1-nerved, 1 mm. ($\frac{1}{4}''$) long; flowering glumes lanceolate, acute, prominently nerved, 1.5 mm. ($\frac{3}{4}''$) long.—Prairies, Kansas, Indian Territory, and Texas. July to September.

This species is related to *E. pectinacea*, but differs in being less diffuse, with shorter branches and larger spikelets.



FIG. 243. **ERAGROSTIS PECTINACEA** (Michx.) Steud. Syn. Pl. Gram 272. 1854. (*Poa pectinacea* Michx. Fl. Bor. Am. 1:69. 1803.)—An erect, caespitose perennial 3–9 dm. (1° – 3°) high, with short, stout rootstocks, and large, spreading, red-purple panicles. Spikelets (*a*, *b*, *c*), 5 to 15 flowered, 3–8 mm. ($1\frac{1}{2}$ "–4") long, on pedicels of at least their own length; empty glumes equal, acute; flowering glumes nearly 2 mm. (1") long, the lateral nerves very prominent.—Dry, sandy soil in the open, Massachusetts to South Dakota and Colorado, south to Florida and Texas. July to October.



FIG. 244. **ERAGROSTIS SIMPLEX** Scribn. sp. nov. (*E. Brownei* of Chapm. Fl. So. U. S. ed. 2, 664 and of Bul. 7 : 262, U. S. Dept. Agr. Div. Agros., eds. 1 & 2, not of Nees.)—A widely spreading, branching perennial, with somewhat wiry culms 2-5 dm. (8'-20') long, and narrow, simple, more or less interrupted panicles of nearly sessile, 10 to 40 flowered spikelets. Sheaths smooth; ligule a fringe of long hairs; leaf-blades variable, 5-15 cm. (2'-6') long, 2-4 mm. (1"-2") wide, usually pilose with few, long, scattered hairs. Spikelets (*a*, *b*) 5-14 mm. (2½"-7") long, nearly sessile; empty glumes nearly equal, acute, about as long as the flowering glumes which are 2 mm. (1") long, obtuse, scabrous on the keel. Palea strongly ciliate on the margins.—Dooryards and waste ground, Florida. (6073 Curtiss, 1897; 1099 Combs and Baker, 1898.) July to October.



FIG. 245. **ERAGROSTIS HYPNOIDES** (Lam.) B. S. P. Prel. Cat. N. Y. 69. 1888. (*Poa hypnoides* Lam. Tabl. Encycl. 1: 185. 1791; *E. reptans* Nees, Agrost. Bras. 514. 1829.)—A prostrate, much-branched, and extensively creeping annual, with ascending, flowering branches 7.5–15 cm. (3'–6') high, spreading leaf-blades, narrow and lax or very dense panicles, and long, linear-lanceolate, strongly compressed spikelets. Sheaths shorter than the internodes, villous above; leaf-blades 5 cm. (2") long or less, 1–2 mm. ($\frac{1}{4}$ "–1") wide, scabrous above. Spikelets (a, b, d) dioecious, 10 to 35 flowered, 4–16 mm. (2"–8") long; empty glumes unequal, the first one-half to two-thirds as long as the second; flowering glumes about 2.5 mm. ($\frac{1}{4}$ ") long. Glumes of the pistillate spikelets (d) more acute than those of the staminate ones (a).—In ditches and sandy banks of streams, Vermont and Ontario to Florida, Texas, California and Washington. (Mexico, West Indies, and South America.) March to October.



FIG. 246. **ERAGROSTIS GLOMERATA** (Walt.) L. H. Dewey, Contr. U. S. Nat. Herb. **2**; 543. 1894. (*Poa glomerata* Walt. Fl. Car. 80. 1788; *P. conferta* Ell. Sk. Bot. S. C. and Ga. **1**: 158. 1811; *Eragrostis conferta* Trin. Mem. Acad. St. Petersb. VI. Sci. Math. Phys. et Nat. **1**: 409. 1831.)—An erect, rather stout, branching annual 6–9 dm. (2° – 3°) high, with smooth sheaths and leaves, and elongated, densely flowered, light-colored panicles 25–60 cm. (10'–24') long. Spikelets (*a*) 6 to 10 flowered, about 3 mm. ($1\frac{1}{4}$ ") long; flowering glumes (*b*) about 1 mm. ($\frac{1}{4}$ ") long, acute, one-fourth longer than the palea.—Low grounds, South Carolina to Florida and westward to Texas. (Cuba, Mexico, and South America.) August to November.



FIG. 247. *ERAGROSTIS FRANKII* Steud. Syn. Pl. Gram. 273. 1854. SHORT-STALKED MEADOW-GRASS.—A low, diffusely branched, glabrous annual 1.5–4 dm. (6'–16') high, with open, many-flowered panicles 5–12 cm. (2'–4½') long. Sheaths loose, shorter than the internodes; leaf-blades 5–12 cm. (2'–5') long, 2–4 mm. (1"–2") wide, smooth beneath, scabrous above. Spikelets (*a*, *b*, *c*) ovate, 3 to 5 flowered; 2–3 mm. (1"–1½") long; empty glumes acute, the first shorter than the second; flowering glumes acute, the lower 1.5 mm. (¾") long, the lateral nerves obscure.—Low, sandy ground in the open, southern New York to Minnesota, south to Georgia, Louisiana, and Kansas. August to October.



FIG. 248. **ERAGROSTIS CILIARIS** (Linn.) Link, Hort. Berol. 1: 192. 1827. (*Poa ciliaris* Linn. Sp. Pl. ed. 2. 102. 1762.)—A diffusely branching, slender annual 2-5 dm. (8'-18') high, with thin, narrow leaves and densely flowered, cylindrical, spike-like, more or less interrupted panicles 5-10 cm. (2'-4') long. Sheaths smooth, bearded at the throat; leaf-blades 5-7 cm. (2'-3') long, smooth. Spikelets (a) 1-3 mm. ($\frac{1}{8}$ "- $\frac{1}{4}$ " long, 5 to 7 flowered, densely crowded on the short, appressed branches; flowering glumes (b) obtuse, mucronate, rough, or ciliate on the back. Palea fringed on the margins with long, bristly hairs.—Cultivated and waste grounds, Georgia and Florida to Mississippi. (Mexico, West Indies, and Asia.) July to October.



FIG. 249. *ERAGROSTIS PLUMOSA* Link, Hort. Berol. 1: 192. 1827.—A slender, diffusely branching annual 1-4 dm. (4'-16') high, with flat leaves and oblong, open panicles 5-15 cm. (2'-6') long. Sheaths shorter than the internodes; leaf-blades 2-10 cm (1'-4') long, 2-4 mm. (1''-2'') wide, smooth beneath, slightly scabrous above. Spikelets (a, b) linear-oblong, 6 to 8 flowered, 1-3 mm. ($\frac{1}{4}$ ''-1 $\frac{1}{4}$ '' long; first glume obtuse, 3-nerved, equaling the long-ciliate flowering glumes, which are about 1 mm. ($\frac{1}{2}$ '' long.—Cultivated and waste ground, southern Georgia and Florida. (Widely distributed in tropical countries.) July to November.

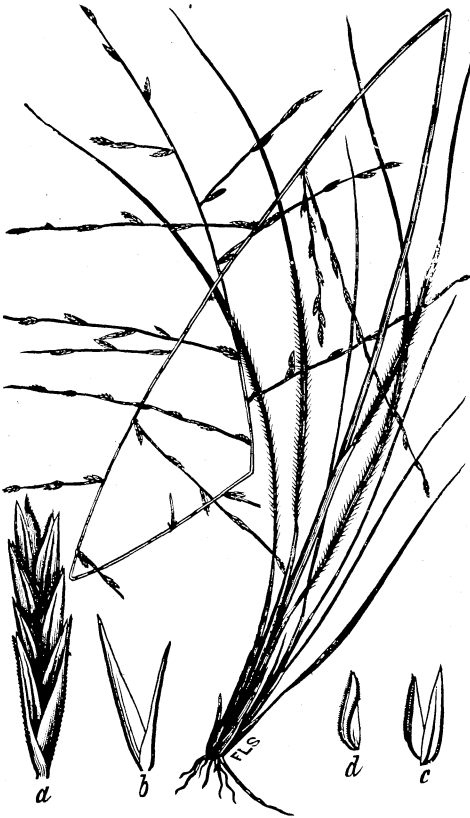


FIG. 250. **ERAGROSTIS SESSILISPICA** Buckl. Proc. Acad. Nat. Sci. Phila. 1862: 97. 1862. (*Diplachne rigida* Vasey, U. S. Dept. Agr. Div. Bot. Bul. 12²: 44, pl. 44. 1891.)—A smooth, wiry, caespitose perennial 3-9 dm. (1°-3°) high, with narrow, mostly involute leaves and pyramidal panicles, the 5 to 12 flowered, appressed spikelets sessile along the spreading branches. Sheaths short, crowded at the base of the culm, smooth, pilose above; leaf-blades 5-15 cm. (2'-6') long, 1.5-3 mm. ($\frac{1}{4}$ "-1 $\frac{1}{4}$ ") wide, scabrous above, glabrous or sparingly pilose beneath. Spikelets (a) scattered, 5 to 12 flowered, 8-14 mm. ($\frac{1}{4}$ "-1 $\frac{1}{2}$ ") long; empty glumes (b) subequal, acute; flowering glumes (c) rigid, ovate, acute, glabrous, about 4 mm. (2") long, the lateral nerves very prominent. The palea is shown by d.—Dry prairies, Kansas to Texas. June to October.



FIG. 251. **EATONIA PENNSYLVANICA** (DC.) A. Gray, Man. Bot. ed. 2. 558. 1856. (*Koeleria pennsylvanica* DC. Hort. Monsp. 117. 1813.) **EATON'S GRASS**.—A slender, pale-green perennial 3-9 dm. (1° - 3°) high, with flat leaf-blades and narrow, terminal panicles 7-18 cm. ($3'$ - $8'$) long. Sheaths shorter than the internodes; ligule 1.5 mm. ($\frac{1}{4}$ ") long; leaf-blades 5-18 cm. ($2'$ - $7'$) long, 2-6 mm. ($1''$ - $3''$) wide, scabrous. Spikelets (a) 3-3.5 mm. ($1\frac{1}{4}''$ - $1\frac{1}{2}''$) long, somewhat crowded and appressed to the branches; empty glumes (b) unequal, the first narrow, shorter than and about one-sixth as broad as the obtuse or abruptly acute second one, which is smooth or slightly scabrous on the keel; flowering glumes (c) narrow, acute, 2.5 ($1\frac{1}{4}''$) long.—Wet meadows, low woods, and thickets, Newfoundland and Maine to British Columbia and Washington, south to Georgia, Mississippi, Texas, and Arizona. April to August.

Var. **MAJOR** Torr. l. e. a taller form with longer and more compound panicles, longer and broader leaves with the range of the type.



FIG. 252. **EATONIA OBTUSATA** (Michx.) A. Gray. Man. Bot. ed. 2, 558. 1856. (*Aira obtusata* Michx. Fl. Bor. Am. 1: 62. 1803.) **EARLY BUNCH-GRASS**.—A tufted perennial 4.5–6 dm. ($1\frac{1}{4}$ –2') high, with flat leaf-blades and rather densely flowered, nodding panicles 5–15 cm. (2'–6') long. Culms erect, glabrous; sheaths shorter than the internodes, usually scabrous and often pubescent; ligule 1–2 mm. ($\frac{1}{4}$ "–1") long; leaf-blades 2–22 cm. (1'–9') long, 2–8 mm. ($\frac{1}{4}$ "–4") wide, scabrous. Spikelets (c) crowded, 2.5–3 mm. ($1\frac{1}{4}$ "–1½") long; empty glumes (a) often purplish, the first shorter than and about one-sixth as wide as the obtuse or truncate second one; flowering flumes (b, d) narrow, obtuse, 1.5–2 mm. ($\frac{3}{4}$ "–1") long.—Low ground, chiefly along streams, usually in shade, Massachusetts and Ontario to Assiniboia and British Columbia, south to Florida, Texas and southern California. March to August.



FIG. 253. **EATONIA NITIDA** (Sprengel) Nash, Bul. Torr. Bot. Club, **22**: 511. 1895. (*Aira nitida* Sprengel, Mant. Fl. Hal. 32. 1807; *Eatonia dudleyi* Vasey, Bot. Gaz. **11**: 116. 1886.)—A slender, erect, and caespitose perennial 3–6 dm. (1°–2°) high, with short, flat, spreading leaves and rather few-flowered, nodding panicles 5–15 cm. (2'–6') long. Sheaths shorter than the internodes, generally pubescent; ligule 0.5 mm. ($\frac{1}{4}$ ") long; leaf-blades 1–8 cm. ($\frac{1}{4}$ '–3') long, 2 mm. (1") wide or less, often pubescent. Spikelets (a) not crowded, 3 mm. ($\frac{1}{4}$ ") long; empty glumes (d) nearly smooth, the first about one-third as wide as, and equaling the second, which is obtuse or almost truncate, often apiculate; flowering glumes (c) 2–2.5 mm. (1"–1 $\frac{1}{4}$ ") long, obtuse or somewhat acute. The palea is shown by b, the lodicules by e, and the stamens and pistil by f.—Dry, open woodlands, Rhode Island and New York westward to North Dakota, and southward to Mississippi and Texas. April to June.

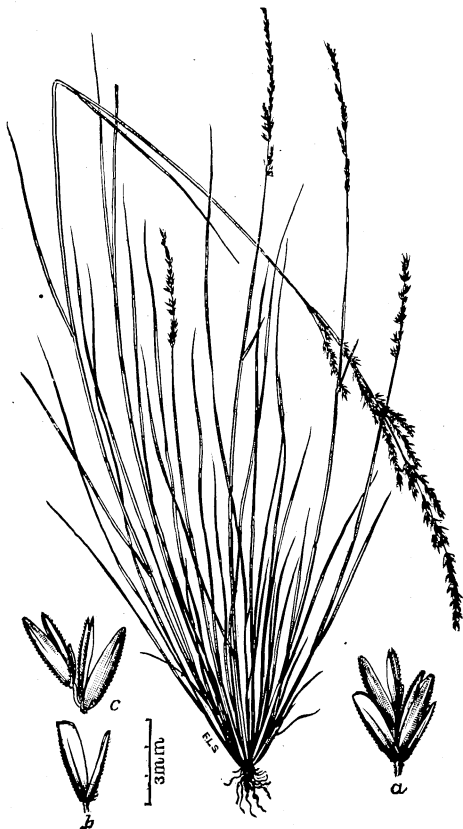


FIG. 254. **EATONIA FILIFORMIS** (Chapm.) Vasey, Bot. Gaz. 11: 117. 1886. (*E. pennsylvanica filiformis* Chapm. Fl. So. U. S. 560. 1860.)—An erect, tufted perennial 3-6 dm. (1°-2°) high, with very long upper internodes and long, involute, radical leaves. Sheaths very shortly woolly-pubescent; leaf-blades rigid, those of the sterile shoots 30-50 cm. (12'-18') long. Panicle very slender, narrow, the few branches appressed. Spikelets (a) scattered, 2 to 3 flowered; the first empty glume (b) linear, acute; the second narrowly obovate; flowering glumes (c) obtuse 2-3 mm. (1"-1½") long. Palea equaling the glume in length.—Dry, sandy soil, South Carolina, Florida, and Texas, north to western Tennessee. March, April.



FIG. 255. *CYNOSURUS CRISTATUS* L. Sp. Pl. 72. 1753. DOG'S-TAIL GRASS.—A slender, erect perennial 3–7.5 dm. (1° – $2\frac{1}{2}^{\circ}$) high, with narrow leaves and rather slender, erect, spike-like panicles 5–10 cm. (2'–4') long. Sheaths shorter than the internodes; ligule 1 mm. ($\frac{1}{8}$ ") long, truncate; leaf-blades 2–13 cm. (1'–5') long, 1–4 mm. ($\frac{1}{8}$ "–2") wide, glabrous. Spikelets arranged in clusters, the terminal ones (a, b) fertile, the lower ones (c) larger and sterile; glumes of the former about 3 mm. ($1\frac{1}{2}$ ") long, pointed or short awned, those of the sterile spikelets very narrow, strongly scabrous on the keel.—Sparingly established in fields and waysides, Newfoundland to Ontario, south to New Jersey; Portland, Oregon. (Europe.) June to August.

This species is valuable for lawns, forming a close, compact sod, and thrives in shaded places. As it has a high nutritive value it is recommended for mixtures used for permanent pastures. The mature stems of this grass are among the most valuable of those used in the manufacture of Leghorn hats.



FIG. 256. **CATABROSA AQUATICA** (L.) Beauv. Agrost. 157. 1812. (*Aira aquatica* L. Sp. Pl. 64. 1753.) **WATER WHORL-GRASS**.—A smooth, soft, perennial with creeping or ascending culms 2-6 dm. ($\frac{1}{3}$ °-2°) long, flat leaves and open panicles 5-20 cm. (2'-8') long, the spreading branches in whorls. Sheaths usually overlapping, loose; ligule 3-5 mm. ($1\frac{1}{4}$ "-2 $\frac{1}{4}$ ") long; leaf-blades 2-12 cm. (1'-5') long, 2-6 mm. (1"-3") wide, flat, obtuse. Spikelets (a, b) 2.5-3.5 mm. ($1\frac{1}{4}$ "-1 $\frac{3}{4}$ ") long; empty glumes (c) rounded or obtuse, the first about one-half as long as the second, which is crenulate on the margins; flowering glumes (d) 2-2.5 mm. (1"-1 $\frac{1}{4}$ ") long, 3-nerved, erose-truncate at the apex.—In swales and along brooks, often in shallow water, Newfoundland and Labrador, to Quebec and Alaska, south to Nebraska, Colorado, and Utah. (Europe and Asia.) June to August.



FIG. 257. **MELICA MUTICA** Walt. Fl. Car. 78. 1788. (*M. glabra* Michx. Fl. Bor. Am. 1 : 62. 1803.)—A slender, loosely caespitose, wiry grass 6–9 dm. (2° – 3°) high, with flat leaves and simple or racemose panicles of rather large, nodding, 2 to 3 flowered spikelets. Sheaths often overlapping, scabrous; ligule 2–4 mm. ($1''$ – $2''$) long; leaf-blades scabrous, 10–23 cm. ($4'$ – $9'$) long, 2–10 mm. ($1''$ – $5''$) wide. Spikelets (*a*) 7–9 mm. ($3\frac{1}{4}''$ – $4\frac{1}{4}''$) long; empty glumes very broad, acute, or obtuse, the first shorter than the second, which nearly equals the spikelet; flowering glumes 6–8 mm. ($3''$ – $4''$) long, obtuse, scabrous. The palea is shown by *b*.—Dry, rocky, open woods and thickets, Pennsylvania to Florida and westward to Wisconsin and Texas. March to May.

This species is distinguished from *M. diffusa*, with which it has been united by some authors, by its more slender habit, less branched and fewer flowered panicle, more nearly equal and longer, empty glumes, broader and more obtuse flowering glumes.



FIG. 258. **MELICA PARVIFLORA** (Porter) Scribn. Mem. Torr. Bot. Club, 5: 50. 1894. (*M. mutica parviflora* Porter in Porter & Coulter Syn. Fl. Colo. 149. 1874; *M. porteri* Scribn. Proc. Acad. Nat. Sci. Phila. 1885: 44. pl. 1. f. 17, 18. 1885.) — A rather slender, erect, smooth perennial 4-7 dm. ($1\frac{1}{4}$ °-2 $\frac{1}{4}$ °) high, with flat leaves and narrow panicles 15-25 cm. (6'-10') long. Sheaths short, overlapping, scabrous; ligule 2 mm. (1") long; leaf-blades 12-23 cm. (5'-9') long, 2-4 mm. (1"-2") wide, scabrous. Spikelets pendulous and racemose along the panicle branches, 4 to 5 flowered, 10-13 mm. (5"-6") long; empty glumes (a) obtuse, the first shorter than the second; flowering glumes (b) 7-8 mm. ($3\frac{1}{8}$ "-4") long, acutish, scabrous.—Shaded canyons, mountains of Colorado, New Mexico, Arizona, and prairies of Missouri, Kansas, and western Texas. (Northern Mexico.) July to September.



FIG. 259. **MELICA SPECTABILIS** Scribn. Proc. Acad. Nat. Sci. Phila. 1885: 45. 1885. (*M. bulbosa* of S. Wats. in King's Explor. 40th Par. 5: 383. 1871; Porter and Coulter Syn. Fl. Colo. 149. 1874; not Geyer, 1856.)—A caespitose, stoloniferous species 3–6 dm. (1°–2°) high, with scabrous, flat leaves and loosely flowered, nodding, simple panicles 10–20 cm. (4'–8') long. Sheaths equaling or exceeding the internodes; ligule about 2 mm. (1") long; leaf-blades plane or involute, 15–20 cm. (6'–8') long, 2–4 mm. (1"–2") wide. Spikelets (*a*) 10–12 mm. (5"–6") long, 3 to 8 flowered; empty glumes (*b*) obtuse or acute, the first shorter than the second, which is 5–6 mm. (2½"–3") long; flowering glumes 7–8 mm. (3½"–4") long, 7 to 9 nerved.—Damp grassy meadows, rich bottom lands, dry hillsides, etc., altitude 950–2,400 m. (2,850°–7,200°), Montana to Washington and Oregon, south to Colorado, Wyoming, and Nevada. June to September.



FIG. 260. **MELICA STRICTA** Boland. Proc. Calif. Acad. Sci. 3:4. 1863. **LARGE-FLOWERED MELICA**.—A densely caespitose perennial 2.5–5 dm. (8'–20') high, from a bulbous base, with flat, more or less pubescent leaves and simple, one-sided panicles 10–15 cm. (4'–6') long, bearing ten to twenty spikelets (*a*) 2 to 4 flowered, 12–16 mm. (6''–8'') long, mostly pendulous on slender, curved, finely pubescent pedicels; empty glumes subequal 12–15 mm. (6''–7½'') long, almost hyaline, 5-nerved; flowering glumes (*b*) narrowly elliptical, 5-nerved, the inclosed palea about 5 mm. (2¼'') long.—Dry ridges among rocks, altitude 1,850 to 2,700 m. (5,550°–8,100°), Nevada, California, and Oregon. June to August.

The inflorescence of this alpine species is similar to that of *M. parviflora*, but the panicle is much shorter, with only about a dozen spikelets, rarely more than twenty, and the spikelets themselves are much larger.



FIG. 261. **MELICA BULBOSA** Geyer in Hook. Journ. Bot. 8 : 19. 1856, nomen.; Gray, Proc. Am. Acad. 8 : 409. 1873. **THICK-ROOTED BUNCH-GRASS**.—A slender, erect, perennial 3–6 dm. (1°–2°) or rarely 9 dm. (3°) high, bulbous at the base, with erect leaves and a narrow, somewhat spikelike panicle 10–15 cm. (4'–6') long. Sheaths and upper surface of the leaves scabrous. Spikelets (a) 10–14 mm. (5''–7'') long, with six to eight perfect florets; empty glumes obtuse, the first about 6 mm. (3'') long, the second 2 mm. (1'') longer, and nearly equaling the first flowering glume (b), which is oblong-lanceolate, obtuse, or notched at the apex. The palea and flowering glume is shown by c and the grain by d.—Dry rocky slopes, moist, shady mountain sides, etc., alt. 900–2,700 m. (2,700°–7,100°). Montana and Wyoming to British Columbia, south to Utah, Nevada, and Oregon; western Texas. May to July.



FIG. 262. **KORYCARPUS DIANDRUS** (Michx.) Kuntze, Rev. Gen. Pl. 2 : 772. 1891. (*Festuca diandra* Michx. Fl. Bor. Am. 1 : 67, pl. 10. 1803; *Diarrhena americana* Beauv. Agrost. 142. pl. 25. f. 11. 1812.)—An erect perennial 6-9 dm. (2° - 3°) high, with long, narrow-lanceolate, nearly erect leaves and a few-flowered, simple panicle 10-25 cm. ($4'$ - $10'$) long. Sheaths overlapping, confined to the lower part of the culm, smooth or somewhat scabrous above; ligule very short; leaf-blades 20-60 cm. ($8'$ - $24'$) long, 10-18 mm. ($5''$ - $9''$) wide, scabrous. Spikelets (a) 3 to 5 flowered, 12-16 mm. ($6''$ - $8''$) long; empty glumes (b) unequal, the first shorter than the second, which is exceeded by the spikelet; flowering glumes (c) somewhat abruptly acuminate. Palea shorter than the glume, exceeded by the bearded grain.—Rich, rocky, wooded hillsides, Ohio to South Dakota, south to Georgia, Arkansas, and Indian Territory. August, September.



FIG. 263. **PLEUROPOGON REFRACTUM** (A. Gray) Benth. in Vasey, U.S. Dept. Agr. Spec. Rept. 63: 40. 1883. (*Lophochlaena refracta*, A. Gray, Proc. Am. Acad. 8: 409. 1872.) **NODDING PLEUROPOGON**.—A slender perennial 6-12 dm. (2°-4°) high, from creeping root-stocks, with flat leaves and terminal racemes of 6 to 10 drooping spikelets. Sheaths smooth or scabrous; ligule obtuse, 3-6 mm. (1½"-3") long; leaf-blades flat, the lower ones about 20 cm. (8') long, 6-8 mm. (¾"-4") wide. Rachis very slender, flexuous. Spikelets (1) refracted by the curving of the pedicels 2-3 cm. (1'-1½') long, loosely flowered; empty glumes (2) unequal; flowering glumes (3) 7-8 mm. (¾"-4") long, scabrous, truncate-erose at the apex, bearing an awn about 6 mm. (¾") long. Palea (4, 5) 7 mm. (¾") long, the wings ending in blunt teeth.—In swamps and along mountain streams, alt. 1,200-3,850 m. (3,600°-11,550°). California to Washington. May to August



FIG. 264. *UNIOLA LATIFOLIA* Michx. Fl. Bor. Am. 1:70. 1803. BROAD-LEAFED SPIKE-GRASS.—An erect grass, with rather stout, simple culms 6–15 dm. (2° – 5°) high, broad, spreading leaf-blades and a drooping panicle of large, flat spikelets (*a*) 2–3 cm. ($\frac{3}{4}$ '– $1\frac{1}{4}$ ') long, on long capillary pedicels; empty glumes (*b*) much smaller than the floral ones (*c*), which are 9–12 mm. ($4\frac{1}{2}$ "–6") long, ciliate-hispid on the winged keel. Sheaths shorter than the internodes; ligule 1 mm. ($\frac{1}{8}$ ") long, lacerate-toothed; leaf-blades 10–22 cm. (4'–9') long, 0.5–2 cm. ($\frac{1}{4}$ '–1') wide, narrowed to a rounded, often ciliate base, acuminate at the apex, scabrous on the margins, otherwise smooth.—Low thickets and shaded banks of streams, Pennsylvania to Florida, west to Illinois, Kansas, and Texas. June to October.

This species has broad, widely spreading leaves, and these, together with the graceful, nodding, open panicles, render it pleasing in appearance and worthy of cultivation for ornamental purposes. It has little or no agricultural value.



FIG. 265. *UNIOLA PANICULATA* L. Sp. Pl. 71. 1753. SEASIDE OATS.—A stout, glabrous, native perennial 9–15 dm. (3° – 5°) high, with long, rigid leaves and showy, nodding panicles of many broad and pale, straw-colored spikelets. Sheaths often longer than the internodes; ligule a ring of hairs about 1 mm. ($\frac{1}{2}$ " long; leaf-blades 30 cm. (12') long or more, about 6 mm. (3") wide, involute when dry, attenuated into a long, slender tip. Spikelets (a) many-flowered, short pedicelled, ovate to oval when mature, 1–2 cm. ($\frac{1}{4}$ '–1') long; empty glumes (c) much shorter than the flowering ones, which are 8–10 mm. (4"–5") long, scabrous on the keel.—In sands of the seacoast, Virginia to Texas. (West Indies and South America.) May to October.

This species from its habit of growth in the drifting sands along the seashore, and by its very strong and deeply penetrating rootstocks forms an excellent sand binder, and is the southern analogue of the northern beach or marram grass (*Ammophila arenaria*). The leaves are sometimes eaten by cattle, but the grass is too tough and dry to be of any importance as a forage plant. The panicles are gathered for dry bouquets, and are often seen in our markets.

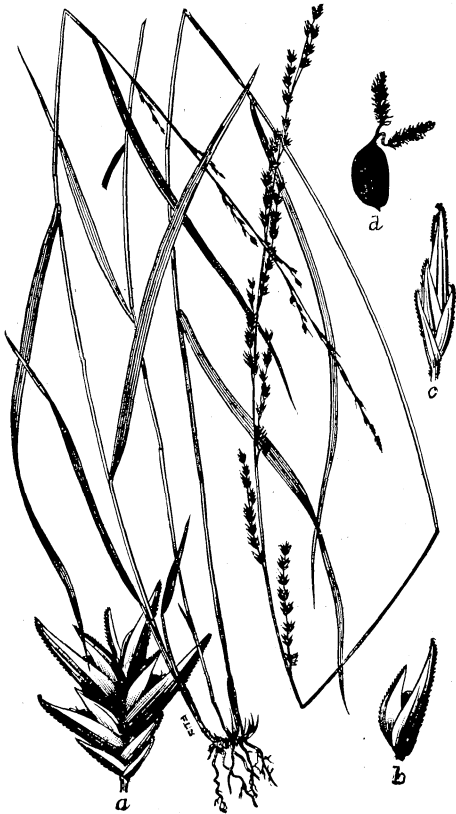


FIG. 266. **UNIOLA LAXA** (L.) B. S. P. Prel. Cat. N. Y. 69. 1888. (*Holcus laxus* L. Sp. Pl. 1048. 1753; *U. gracilis* Michx. Fl. Bor. Am. 1 : 71. 1803.—A slender, glabrous grass 6-9 dm. (2° - 3°) high, with long, narrow leaf-blades, and contracted, wand-like nodding panicles 15-45 cm. (6'-18') long. Sheaths shorter than the internodes; ligule very short; leaf-blades 12-36 cm. (5'-15') long, 2-6 mm. ($1''$ - $3''$) wide, usually erect, plane, attenuate into a long tip. Spikelets (*a*) short-pedicellate, 3 to 6 flowered, about 6 mm. ($3''$) long; empty glumes much smaller than the flowering glumes (*b*) which are 3-4 mm. ($1\frac{1}{2}''$ - $2''$) long, acuminate, spreading in fruit. Palea arched, about two-thirds as long as the glume.—In dry soil, open woods, and banks, Long Island to Florida, west to Kentucky, Tennessee, and Texas. June to October.

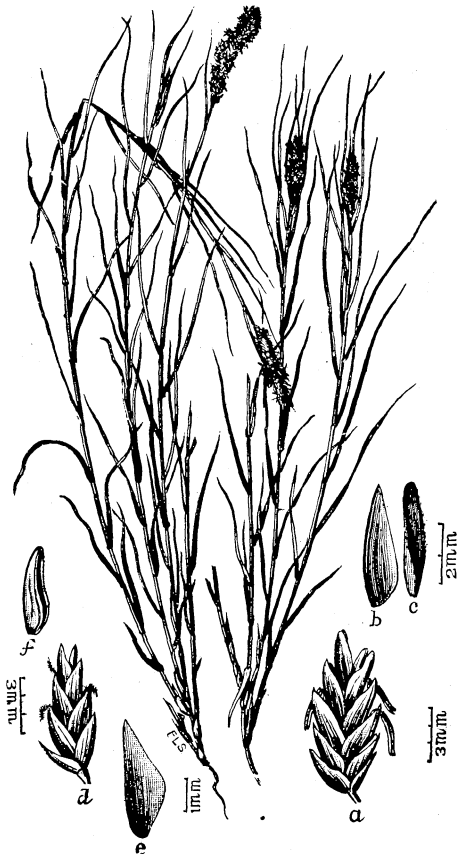


FIG. 267. **DISTICHLIS SPICATA** (L.) Greene, Bul. Calif. Acad. Sci. 2: 415. 1887. (*Uniola spicata* L. Sp. Pl. 71. 1753; *D. maritima* Raf. Journ. Phys. 89: 104. 1819.) **ALKALI-GRASS**.—An upright, dioecious, wiry grass, 1.5–6 dm. ($\frac{1}{2}$ –2°) high, with strong and widely creeping rootstocks, rather rigid leaves, and densely flowered panicles. Sheaths overlapping and often crowded; leaf-blades 1–15 cm. ($\frac{1}{4}$ –6') long, 2–4 mm. (1"–2") wide, flat or involute. Pistillate spikelets (*d*) 8–16 mm. (4"–8") long, 4 to 13 flowered; flowering glume (*e*) 3–5 mm. ($1\frac{1}{4}$ "–2 $\frac{1}{4}$ ") long; staminate spikelets (*a*) 8–18 mm. (4"–9") long, 6 to 18 flowered, on slender pedicels; empty glumes unequal; flowering glumes (*b*) 5–6 mm. (2 $\frac{1}{4}$ "–3") long.—Salt marshes along the coast, Maine to Texas and British Columbia to California; alkaline soil in the interior, Nebraska and Kansas to Montana, eastern Washington, California, and New Mexico. May to August.

This species thrives on strongly alkaline soils, where other vegetation will not grow, but is considered a nuisance in farming lands on account of its tough, matted roots. Although sometimes eaten by stock in the absence of better sorts, it has little agricultural value. It is a good grass for binding drifting sands or soils subject to wash.



FIG. 268. **BRIZA MEDIA** L. Sp. Pl. 70. 1753. **QUAKING-GRASS**.—A slender, erect perennial 1.5–6 dm. ($\frac{1}{2}$ –2°) high, with rather short, flat leaf-blades and capillary, spreading panicles 4–12 cm. ($1\frac{1}{4}$ '–5') long. Sheaths shorter than the internodes; ligule 1 mm. ($\frac{1}{4}$ ") long or less; leaf-blades 2–8 cm. (1'–3') long; 2–5 mm. ($1''$ – $2\frac{1}{4}''$) wide. Spikelets (a) 4–5 mm. ($2''$ – $2\frac{1}{4}''$) long, 5 to 12 flowered, orbicular to deltoid-ovate; empty glumes about 2 mm. (1") long; flowering glumes (b) 2–3 mm. ($1''$ – $1\frac{1}{4}''$) long, scarious margined. The palea is shown by c.—Sparingly naturalized in fields and waste grounds, in Ontario, New England, and California. (Europe and Asia.) May to July.

This species was introduced from Europe because of its pleasing appearance and is occasionally cultivated for ornamental purposes. It is little known in this country, but is classed as a valuable meadow grass in middle Europe, and is recommended for mixtures for pastures on dry, thin soils.

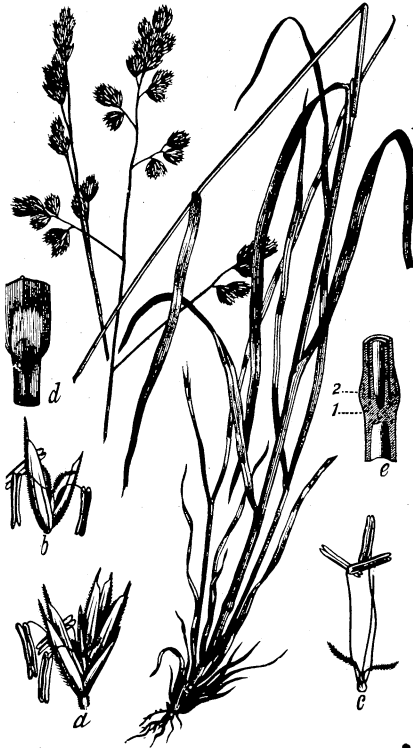


FIG. 269. *DACTYLIS GLOMERATA* L. Sp. Pl. 71. 1753. ORCHARD-GRASS.—A coarse, erect grass 9–12 dm. (3° – 4°) high, forming dense tufts, with long, flat or slightly keeled leaf-blades and 3 to 5 flowered spikelets (*a*) crowded in dense, one-sided clusters at the ends of the panicle branches. Ligule (shown in *d*) thin, membranaceous, elongated; flowering glume (*b*) 4–6 mm. ($2''$ – $3''$) long, short awn-pointed. At *b* a floret is illustrated, showing flowering glume, palea, stamens, and stigmas; the flower and lodicules are shown at *c* and the joint in the culm *e*, 1 and the swollen base of the leaf-sheath is shown at *e*, 2.—Extensively naturalized in fields and waste ground, New Brunswick to South Carolina, west to Manitoba, Idaho, and Colorado. (Europe.) May to August.

Orchard-grass is one of the best known and highly esteemed of our cultivated grasses. It is valuable for hay or pasturage and grows well in the shade. Owing to its habit of growing in tussocks or bunches it is not adapted to lawns.



FIG. 270. **LAMARCKIA AUREA** (L.) Moench. Meth. 201. 1794. (*Cynosurus aureus* L. Sp. Pl. 107. 1753.) **GOLDEN-TOP**.—A caespitose, branching annual 1-3 dm. ($\frac{1}{2}$ °-1°) high, with elegant one-sided panicles 5-8 cm. (2'-3 $\frac{1}{4}$ ') long. Sheaths loose, shorter than the internodes; ligule hyaline, 2-8 mm. (1"-4") long; leaf-blades thin, 2-10 cm. (1'-4') long, 2-6 mm. (1"-3") wide; staminate spikelets (b) 1-flowered; empty glumes subequal, narrow; flowering glume about 3 mm. (1 $\frac{1}{8}$ ") long, bearing a dorsal awn just below the apex, 6-9 mm. (3"-4 $\frac{1}{2}$ ") long; pistillate spikelets (a) elongated, bearing several truncate, awnless empty glumes above the two outer acute ones.—Introduced into southern and Lower California. (Southern Europe, northern Africa, and Australia.) March to May.

This species is a very attractive and popular ornamental grass, and is frequently cultivated for edgings, etc. It has escaped from cultivation in southern California, and has become spontaneous there.



FIG. 271. **POA CHAPMANIANA** Scribn. Bul. Torr. Bot. Club, 21 : 38. 1894. (*Poa cristata* Chapm. Fl. So. U. S. 562. 1860, not Walt. 1788.)—A low, caespitose annual 1-2 dm. (4'-8') high, with ascending, flat leaves and usually narrow panicles 2-8 cm. (1'-3') long. Sheaths close, mostly at the base of the culm; ligule 1 mm. ($\frac{1}{4}$ ") long, truncate; leaf-blades 1-2 cm. ($\frac{1}{2}$ '-1') long, 1 mm. ($\frac{1}{4}$ ") wide or less, smooth. Spikelets (a, b) 3 to 7 flowered 2.5-3 mm. ($1\frac{1}{4}$ "-1 $\frac{1}{2}$ ") long; empty glumes about equal, 3-nerved, acute; flowering glumes (c) webbed at the base, obtuse, 3-nerved, sometimes obscurely 5-nerved, the prominent nerves sometimes pilose for three-fourths their length, the keel with a prominent crest-like fringe.—Dry, sandy soil, southern Illinois to Mississippi and Georgia. April, May.

Allied to *P. annua*, but more strict in habit of growth.



FIG. 272. **POA ALPINA** L. Sp. Pl. 67. 1758. MOUNTAIN SPEAR-GRASS.—A slender, or stout, caespitose, glabrous, erect perennial 0.5–3 dm. (3'–12') high, with rather broad, flat leaves and spreading pyramidal panicles of comparatively large spikelets. Sheaths shorter than the internodes; ligule 2 mm. (1") long, truncate; leaf-blades 2–8 cm. (1'–3') long, 2–4 mm. (1"–2") wide, abruptly acute. Spikelets (*a, b, c*) 3 to 6 flowered, 5–6 mm. (2½"–3") long; empty glumes broad, glabrous except for the scabrous keel; flowering glumes (*d*) about 4 mm. (2") long, pilose for half their length, pubescent between the nerves toward the base.—Edges of brooks, open grassy mountain slopes, canyons, etc., Newfoundland and Quebec to Hudson Bay and Alaska, south in the mountains to Colorado, altitude 3,600 m. (10,800'), Utah and California. (Widely distributed, arctic and subalpine.) June to August.



FIG. 273. *POA PRATENSIS* L. Sp. Pl. 67. 1753. KENTUCKY BLUE-GRASS.—

A slender, erect, stoloniferous perennial 3-12 dm. (1° - 4°) high, with narrow, flat leaves and more or less spreading, usually pyramidal panicles 5-20 cm. (2'-8') long. Sheaths often exceeding the internodes; ligule 1.5 mm. ($\frac{1}{4}$ ") long or less; leaf-blades 1-6 mm. ($\frac{1}{8}$ "-3") wide, those of the culm 5-15 cm. (2'-6') long, the basal ones much longer. Spikelets (a) 3 to 5 flowered, 4-5 mm. (2"-2 $\frac{1}{2}$ ") long, exceeding their pedicels; empty glumes acute, unequal, scabrous on the keel; flowering glumes (b) 3 mm. (1 $\frac{1}{4}$ ") long, 5-nerved, webbed at the base, the midnerve and marginal ones silky-pubescent below, the intermediate ones naked.—Fields and meadows throughout the United States and British America, abundantly naturalized in the East, indigenous in the North and West. (Europe and Asia.) Summer.

This species is an extremely valuable pasture grass, and reaches its greatest perfection in the limestone regions of Kentucky and Tennessee. It is much used for a lawn grass in the Eastern and Middle States, for which use it is well adapted, as it makes a fine, close sod and is especially valuable for terraces and embankments.



FIG. 274. *POA KELLOGGII* Vasey, U.S. Dept. Agr. Div. Bot. Bul. 13: 79. *pl.* 79. 1893. *KELLOGG'S SPEAR-GRASS*.—Slender, erect or ascending perennial 3–9 dm. (1° – 3°) high, with rather long, flat leaves and open pyramidal panicles 7–10 cm. ($2\frac{1}{4}$ '–4') long. Sheaths nearly smooth, about equaling the internodes; leaf-blades plane or loosely involute, 15–30 cm. (6'–12') long, 4–8 mm. ($2''$ – $4''$) wide. Spikelets (a) about 6 mm. ($3''$) long, loosely 2 to 3 flowered; empty glumes ovate, acute, scabrous on the keels, the first 1-nerved, shorter than the second 3-nerved one; flowering glumes (b) about 4 mm. ($2''$) long, 5-nerved nearly to the apex, the midnerve barely excurrent, smooth, except for the long, thin web at the base. Palea 2-toothed, nearly smooth on the green keels, slightly shorter than the glume.—California (4705 Bolander).



FIG. 275. *POA SYLVESTRIS* A. Gray, Man. Bot. 596. 1848. WOODLAND SPEAR-GRASS.—A slender, tufted perennial 3-9 dm. (1° - 3°) high, with open panicles 10-15 cm. (4'-6') long, the branches spreading or reflexed. Sheaths shorter than the internodes; ligule 1 mm. ($\frac{1}{4}$ ") long or less; leaf-blades smooth beneath, scabrous above, 2-6 mm. (1"-3") wide, those of the culm 3-15 cm. ($1\frac{1}{4}$ '-6') long, the basal ones much longer. Spikelets (a) 2 to 4 flowered, 2-4 mm. (1"-2") long; empty glumes acute, the first 1-nerved, the second longer and 3-nerved; flowering glumes (b) about 2.5 mm. ($1\frac{1}{4}$ ") long, webbed at the base, obtuse, often pubescent below, 5-nerved, the midnerve pubescent throughout.—Rich woods and thickets, New York to Wisconsin and Nebraska, south to North Carolina, Louisiana, and Texas. April to July.



FIG. 276. **POA BREVIFOLIA** Muhl. Gram. 138. 1817. SOUTHERN SPEAR-GRASS.—An erect perennial 3-9 dm. (1° - 3°) high, with running rootstocks, short culm leaves, and widely spreading, few-flowered panicles 7-12 cm. ($2\frac{1}{2}$ '-5') long. Sheaths about equaling the internodes; ligule 2-3 mm. ($1''$ - $1\frac{1}{2}''$) long; leaf-blades smooth beneath, scabrous above, 2-4 mm. ($1''$ - $2''$) wide, abruptly acute, those of the culm 1-10 cm. ($\frac{3}{4}$ '-4') long. Spikelets (a) 3 to 6 flowered, 5-7 mm. ($2\frac{1}{4}''$ - $3\frac{1}{4}''$) long; empty glumes unequal, acute, glabrous, the first 1-nerved, the second 3-nerved; flowering glumes (b) obtuse, 5-nerved, 4-5 mm. ($2''$ - $2\frac{1}{4}''$) long, slightly webbed at the base, the keel and marginal nerves sparingly pubescent.—Wooded river bluffs and the grassy summits and wooded slopes of mountains, New Jersey to northern Ohio and Illinois, south to North Carolina and Tennessee. March to May.



FIG. 277. **POA ARIDA** Vasey, Contr. U. S. Nat. Herb. 1:270. 1893. (*P. andina* Nutt. in S. Wats. King's Explor. 40th Par. 5:388. 1871, not Trin. 1836.) **PRAIRIE SPEAR-GRASS**.—An erect, often rather rigid, stoloniferous perennial 3-6 dm. (1° - 2°) high, with flat or folded stiff leaves and narrow, rather densely flowered panicles 8-15 cm. (3'-6') long. Sheaths usually overlapping; ligule 2-4 mm. ($1''$ - $2''$) long, acute; leaf-blades smooth beneath, scabrous above, 1-2 mm. ($\frac{1}{8}''$ - $1''$) wide, basal ones 7-15 cm. (3'-6') long, those of the culm shorter, pungently pointed. Spikelets (a) 4 to 7 flowered, 5-7 mm. ($2\frac{1}{4}''$ - $3\frac{1}{2}''$) long; empty glumes nearly equal, acute, 3-nerved; flowering glumes (c) strongly silky-pubescent on the nerves below, 3-4 mm. ($1\frac{1}{2}''$ - $2''$) long, erose-truncate at the apex, the lower part very pubescent between the nerves.—Meadows and low grounds, Northwest Territory to Kansas and Arizona. April to August.



FIG. 278. **POA BUCKLEYANA** Nash, Bul. Torr. Bot. Club, **22**: 465. 1895. (*Poa tenuifolia* Buckley, Proc. Acad. Nat. Sci. Phila. **1862**: 96. 1862, not A. Rich. 1851.) **BUNCH RED-TOP**.—A rather slender, erect perennial "bunch grass" 3-6 dm. (1°-2°) high, with numerous soft radical leaves and narrow panicles 2-10 cm. (1'-4') long. Sheaths shorter than the internodes; ligule 4-6 mm. (2"-3") long, acute; leaf-blades 2-10 cm. (1'-4') long, about 2 mm. (1") wide, plane or involute. Spikelets (*a*, *b*) 2 to 5 flowered, 4-6 mm. (2"-3") long; empty glumes, acute, nearly equal, scabrous on the keel; flowering glumes (*c*) 4 mm. (2") long, sparingly pubescent on the nerves and sometimes somewhat hispid below. The palea is shown by *d*.—Usually in dry soil of "bench" lands, mountain slopes, elevated prairies, etc., alt. 450 to 3,900 m. (1,350°-11,700°), South Dakota to British Columbia, Colorado, and California. May to September.



FIG. 279. **GRAPHEPHORUM MELICOIDEUM** (Michx.) Beauv. Agrost. 164. pl. 15. f. 8. 1812. (*Aira melicoides* Michx. Fl. Bor. Am. 1: 62. 1803.)—A rather slender, erect, pale-green, caespitose perennial 3-6 dm. (1°-2°) high, with flat leaves and loosely flowered, nodding panicles 7-14 cm. (3'-6') long. Sheaths usually shorter than the internodes, smooth, or the lower ones often villous; leaf-blades 4-22 cm. (1½'-9') long, 2-4 mm. (1"-2") wide, long-acuminate, scabrous. Spikelets (a) 2 to 4 flowered, 5-6 mm. (2¼"-3") long; empty glumes (b) scabrous on the keel, the first 1-nerved or obscurely 3-nerved, shorter than the 3-nerved second one; flowering glumes (c) 3 to 5 nerved, acute, bearing a short awn just below the apex.—Rocky or gravelly river shores, low woods (sometimes pine woods), etc. Anticosti Island to Vermont, Michigan, and Northwest Territory. August, September. (Allied to *Trisetum*.)



FIG. 280. **PANICULARIA AMERICANA** (Torr.) MacM. Met. Minn. Val. 81. 1892. (*Poa aquatica* var. *americana* Torr. Fl. U. S. 1 : 108. 1824; *Glyceria grandis* S. Wats. in A. Gray, Man. Bot. ed. 6, 667. 1890.) REED MEADOW-GRASS.—A stout perennial 9–15 dm. (3°–5°) high, with rather broad, flat, leaf-blades, and an ample open panicle 20–38 cm. (8'–15') long. Sheaths loose; ligule 2–4 mm. (1"–2") long, truncate; leaf-blades 18–30 cm. (7'–12') long or more, 6–16 mm. (3"–8") wide, usually smooth beneath, scabrous above. Spikelets (a) 4 to 7 flowered, 4–6 mm. (2"–3") long; empty glumes (b) acute, 1-nerved; flowering glumes obtuse, distinctly 7-nerved, about 2 mm. (1") long.—Shaded banks of streams, wet meadows, moist thickets, etc., New Brunswick to Alaska, south to Pennsylvania, Tennessee, Nebraska, New Mexico, and southern California. June to August.

This species is liked by cattle and is a good pasture grass for wet lands and in such places forms a considerable portion of the native hay. Closely related to the European *P. aquatica* (Smith) Kuntze.



FIG. 281. **PANICULARIA NERVATA** (Willd.) Kuntze, Rev. Gen. Pl. 2 : 783. 1891. (*Poa nervata* Willd. Sp. Pl. 1 : 389. 1797; *Glyceria nervata* Trin. Mém. Acad. St. Pétersb. VI., Sci. Math. Phys. et Nat., 1. 365. 1831.) FOWL MEADOW-GRASS.—A leafy perennial 3-9 dm. (1° - 3°) high, with expanded, nodding panicles, and rather small spikelets. Sheaths scabrous; ligule 2-4 mm. ($1''$ - $2''$) long; truncate; leaf-blades 15-30 cm. (6'-12') long, 4-10 mm. ($2''$ - $5''$) wide, scabrous above, acute. Spikelets (a, b) 2-4 mm. ($1''$ - $2''$) long, 3 to 7 flowered, obtuse; empty glumes rather broadly ovate, less than 1 mm. ($\frac{1}{4}''$) long; flowering glumes (c, d) truncate-obtuse, strongly 7-nerved.—Wet meadows, marshes, moist thickets, etc., Newfoundland to Florida, west to British Columbia, California, and Arizona. June to September.

Extremely variable in size according to soil and location. It is of some value as a fodder plant for moist meadows, and, together with *P. americana* and *Zizania aquatica*, furnishes food for water fowl during the fall migrations, and for this reason it is of value in game preserves.



FIG. 282. **PANICULARIA ELONGATA** (Torr.) Kuntze, Rev. Gen. Pl. 2: 783. 1891. (*Poa elongata* Torr. Fl. U. S. 1: 112. 1824; *Glyceria elongata* Trin. Gram. Suppl. 58. 1836.)—An erect perennial 6-9 dm. (2° - 3°) high, with flat leaf-blades and narrow, rather densely flowered panicles 8-30 cm. ($3'$ - $12'$) long. Sheaths smooth, closed nearly to the summit; ligule very short; leaf-blades 15-30 cm. ($6'$ - $12'$) long, 4-6 mm. ($2''$ - $3''$) wide, smooth beneath, very scabrous on the upper surface. Spikelets (a) 3 to 4 flowered, about 4 mm. ($2''$) long; empty glumes acute, the second larger than the first and nearly equaling the first flowering glume; flowering glumes (b) broadly ovate, about 2 mm. ($1''$) long, distinctly 7-nerved.—In rich, wet woods, Newfoundland and New Brunswick to North Carolina, west to Quebec, Minnesota, and Kentucky. July to September.



FIG. 283. **PANICULARIA PALLIDA** (Torr.) Kuntze, Rev. Gen. Pl. 2 : 783. 1891. (*Windsoria pallida* Torr. Cat. N. Y. 91. 1819; *Glyceria pallida* Trin. Gram. Suppl. 57. 1836.) **PALE MANNA-GRASS**.—A perennial, with slender stems 3-9 dm. (1° - 3°) long, ascending from a more or less decumbent base, and lax, few-flowered panicles 7-15 cm. (3'-6') long, with ascending branches. Sheaths smooth; ligule 2-4 mm. ($1''$ - $2''$) long; leaf-blades 5-15 cm. (2'-6') long, 2-4 mm. ($1''$ - $2''$) wide, scabrous, acute. Spikelets rather narrowly oblong, 6-8 mm. ($3''$ - $4''$) long, loosely 4 to 9 flowered; empty glumes (a) ovate, the second 3-nerved, about 2 mm. ($1''$) long, exceeding the 1-nerved first one; flowering glumes (b) 2-3 mm. ($1''$ - $1\frac{1}{4}''$) long, minutely dentate at the obtuse apex, distinctly 7-nerved.—Bogs, banks of streams and ponds, Cape Breton to Ontario, south to Virginia, eastern Tennessee, and Indiana. June to August.



FIG. 284. **PANICULARIA CANADENSIS** (Michx.) Kuntze, Rev. Gen. Pl. 2: 783. 1891. (*Briza canadensis* Michx. Fl. Bor. Am. 1: 71. 1803; *Glyceria canadensis* Trin. Mém. Acad. St. Pétersb. VI. Sci. Math. Phys. et Nat. 1: 366. 1831.) **RATTLESLAKE-GRASS**.—A stout native perennial 6-9 dm. (2° - 3°) high, with flat leaves, and ample, nodding panicles of rather large spikelets. Sheaths shorter than the internodes, the basal ones overlapping; ligule 2 mm. ($1''$) long, truncate; leaf-blades 15-30 cm. ($6'$ - $12'$) long or more; 4-8 mm. ($2''$ - $4''$) wide, scabrous. Spikelets 5 to 12 flowered, flattened, turgid, 5-8 mm. ($2\frac{1}{4}''$ - $4''$) long; empty glumes unequal, acute, 1-nerved; flowering glumes (*c*, *d*), 3-4 mm. ($1\frac{1}{4}''$ - $2''$) long, obtuse or acute, obscurely 7-nerved.—Marshes and ditches, Newfoundland and Nova Scotia to Minnesota, south to New Jersey, Ohio, and Kansas. June to August.



FIG. 285. **PANICULARIA FLUITANS** (L.) Kuntze, Rev. Gen. Pl. 2:782. 1891. (*Festuca fluitans* L. Sp. Pl. 75. 1753; *Glyceria fluitans* R. Br. Prodr. Fl. Nov. Holl. 1: 179. 1810.) FLOATING MANNA-GRASS.—An erect grass 9-15 dm. (3° - 5°) high, with somewhat flattened culms, long leaves, and a narrow panicle about 3 dm. (1°) long. Sheaths loose, generally overlapping; ligule 4-6 mm. ($2''$ - $3''$) long; leaf-blades 15-30 cm. ($6'$ - $12'$) long or more, 4-12 mm. ($2''$ - $6''$) wide, scabrous, often floating. Spikelets (c) linear, 7 to 13 flowered, 8-24 mm. ($4''$ - $12''$) long; empty glumes unequal, broad, hyaline, faintly nerved at the base; flowering glumes (b) about 6 mm. ($3''$) long, 7-nerved, scabrous, obtuse, entire at the apex, or obscurely toothed.—Wet places, often in running water, Newfoundland to Alaska, south to North Carolina, Tennessee, Texas, and California. (Widely distributed in temperate regions.) May to September.

This species makes excellent fodder and is valuable for swampy meadows. In some parts of Europe the grain is gathered and used for food.



FIG 286. **PUCCINELLIA MARITIMA** (Huds.) Parl. Fl. Ital. 1:370. 1848. (*Poa maritima* Huds. Fl. Angl. 35. 1762; *Glyceria maritima* Mert. & Koch. Roehl. Deutsch. Fl. 1: 588. 1823.) **SEA SPEAR-GRASS**.—A slender perennial 2-5 dm. (8'-20') high, from creeping rootstocks, with narrow, flat, or folded leaves, and more or less expanded panicles 8-12 cm. (3'-5') long. Sheaths usually exceeding the internodes; ligule 1-2 mm. ($\frac{1}{8}$ "-1") long; leaf-blades 1-13 cm. ($\frac{1}{4}$ '-5') long, 2 mm. (1") wide or less, plane or involute. Spikelets (*a, b*) 3 to 10 flowered, 6-12 mm. (3"-6") long; empty glumes unequal, the first 1-nerved, the second 3-nerved; flowering glumes (*c*) obtuse or truncate, 3-4 mm. ($1\frac{1}{8}$ "-2") long.—Salt marshes and beaches along the coast, Labrador to southern New England, and Alaska to British Columbia; also on ballast and waste ground in seaports farther south. (Europe and Asia.) July, August.

This species occurs on the marshes along the seacoasts of New England and the middle States, and forms a valuable element of the "salt" hay from these marshes.



FIG. 287. **FESTUCA ELATIOR ARUNDINACEA** (Schreb.) Hack. Monog. Fest. Eu. 152. 1882. (*F. arundinacea* Schreb. Spicil. Fl. Lips. 57. 1771.) REED FESCUE.—A stout, leafy perennial 9-12 dm. (3° - 4°) high, with broad, flat leaves, and ample, elongated panicles often 3 dm. (1°) long, nodding at the apex, the lower branches bearing many (4 to 15) spikelets; spikelets (a) elliptical, 14-18 mm. ($7''$ - $9''$) long, 5 to 8 flowered.—Introduced here and there, District of Columbia, Michigan, Utah, Oregon, etc. (Europe.) August.

This variety is a tall, vigorous growing, hardy form, with long and abundant basal leaves, and yields a large amount of hay of excellent quality, succeeding best on lands that are comparatively moist.



FIG. 288. **FESTUCA ELATIOR PRATENSIS** (Huds.) Hack. Monog. Fest. Eu. 150. 1882. (*F. pratensis* Huds. Fl. Angl. ed. 1, 37. 1762.) MEADOW FESCUE.—An upright perennial 6-9 dm. (2° - 3°) high, with numerous flat leaves and a rather narrow panicle 10-20 cm. (4'-8') long, usually erect, the branches solitary or the lower in pairs, with few (1 to 4) spikelets (*a*) 9-12 mm. ($4\frac{1}{2}$ "-6") long.—In fields and waysides, introduced, Nova Scotia to North Carolina, west to Washington, Oregon, and Kansas. (Europe.) June to August.

A valuable hay grass, differing from the species, *F. elatior*, in its smaller size and narrower, fewer-flowered panicles.



FIG. 289. **FESTUCA RUBRA GLAUDESCENS** (Hegetschw.) Hack. Monog. Fest. Eu. 139. 1882. (*F. glaucescens* Hegetschw. Fl. Schw. 93. 1840.) TENNESSEE FESCUE.—A slender perennial 3–6 dm. (1° – 2°) high, with creeping rootstocks, erect or ascending stems, very narrow, usually glaucous leaves, and lax, nodding panicles. Sheaths and leaves smooth; the lower leaves 30–45 cm. (12'–20') long, those of the culm shorter and minutely strigose on the upper surface. Panicle lax, nodding. Spikelets (*a*, *b*) 8–10 mm. ($4''$ – $5''$) long, 5 to 6 flowered; empty glumes unequal, the first 2–3 mm. ($1''$ – $1\frac{1}{4}''$) long and 1-nerved, the second 2–6 mm. ($2''$ – $3''$) long and 3-nerved; flowering glumes (*c*) about 6 mm. ($3''$) long, mucronate or short awn-pointed, scabrous near the apex.—Bluffs of Cumberland River, Nashville, Tenn. May.

This is an excellent turf-forming species and is closely related to *F. rubra*. It is recommended for pastures, especially on worn-out soils and hill slopes.



FIG. 290. **BROMUS INERMIS** Leyss. Fl. Hal. 16. 1761. SMOOTH BROME or HUNGARIAN BROME-GRASS.—An erect perennial 6-15 dm. (2° - 5°) high, with creeping rootstocks, open panicles 12-18 cm. ($5'$ - $7'$) long, and 5 to 9 flowered, awnless spikelets (a) 2-3 cm. ($1'$ - $1\frac{1}{4}'$) long. Sheaths striate, smooth, or the lower ones pilose; leaf-blades 10-20 cm. ($4'$ - $8'$) long, 6-8 mm. ($3''$ - $4''$) wide, somewhat scabrous, the lower often sparingly pilose. Rachilla pubescent; empty glumes unequal; flowering glumes (c) awnless or very short awned, with a rather broad, scarious margin at the obtuse or emarginate apex.—A native of Europe, introduced and cultivated in many parts of the United States for hay. June, July.

The strong, perennial character of this grass and its unusual drought-resisting powers are qualities which recommend it for general cultivation, particularly in the semiarid regions of the West and Northwest, and it is one of the most valuable forage plants for this region.



FIG. 291. *BROMUS SECALINUS* L. Sp. Pl. 76. 1753. CHESS or CHEAT.—An erect annual 6-9 dm. (2° - 3°) high, with flat leaves, more or less expanded panicles, and turgid, short-awned spikelets, which are pendulous in fruit 10-20 cm. (4'-8') long. Sheaths striate; ligule short; leaf-blades 15-30 cm. (6'-12') long, rather broadly linear, smooth beneath, more or less scabrous and pilose above. Spikelets (a) 12-20 mm. (6''-10'') long, 6 to 12 flowered; empty glumes acute, the first 3 to 5 nerved; flowering glumes obscurely 7-nerved, smooth, or minutely downy along the margins above.—Naturalized in cultivated and waste grounds, especially in grain fields. (Europe and Asia.) June to August.

From the occurrence of this grass in grain fields arose the illusion that it was degenerated wheat, hence the name cheat or chess, but this idea is without any foundation whatever in fact. It should be classed as a troublesome weed.



FIG. 292. **BROMUS BRIZIFORMIS** Fisch. & Mey. Ind. Sem. Hort. Petrop. 3: 30. 1837. BRIZA-LIKE BROME-GRASS.—A slender, erect, caespitose annual 2-5 dm. (8'-20') high, with soft, flat leaves and nodding panicles of large 10 to 15 flowered spikelets 2-3 cm. (1'-1½') long. Sheaths shorter than the internodes, the lower ones pubescent, with soft villous hairs; leaf-blades 2-18 cm. (1'-7') long, 2-6 mm. (1"-3") wide, pubescent. Spikelets (a) laterally much compressed; empty glumes (b) obtuse, often purplish, glabrous or minutely pubescent, the first 3 to 5 nerved, the second larger, 5 to 9 nerved; flowering glumes (c) 6-8 mm. (3"-4") long, obtuse, 9-nerved, shining, glabrous, or minutely pubescent. The palea is shown by d.—Meadows and cultivated fields, introduced, Montana to Washington, south to Utah, Nevada, and California; sparingly in Massachusetts, New York, and Pennsylvania. (Europe and Asia.) June to August.



FIG. 293. **BROMUS UNIOLOIDES** (Willd.) H. B. K. Nov. Gen. et Sp. Pl. 1: 151. 1815. (*Festuca unioloides* Willd. Hort. Berol. 1: 3. pl. 3. 1806.) RESCUE-GRASS.—An erect, usually annual grass, 3-12 dm. (1° - 4°) high, with more or less pubescent, flat leaf-blades, and usually nodding, loose panicles of rather large, strongly flattened spikelets. Sheaths and leaves scabrous; ligule rather long, obtuse. Spikelets oblong-lanceolate, 16-32 mm. ($8''$ - $16''$) long, 6 to 10 flowered; empty glumes (*a*) unequal; flowering glumes (*b*) about 12 mm. ($6''$) long, keeled. The palea is shown by *c*.—Prairies and dry, sandy fields, Indian Territory and Texas to Arizona; naturalized in Alabama. (Mexico and South America.) March to July.

This species is a valuable forage grass in the South, and in many sections where it has been most cultivated it has come to be regarded as one of the best winter grasses, as it makes its chief growth during the cooler part of the year.

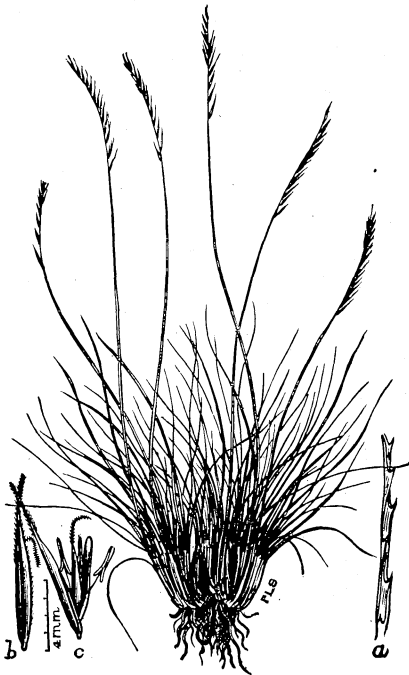


FIG. 294. **NARDUS STRICTA** L. Sp. Pl. 53. 1753. WIRE BENT.—A glabrous, densely caespitose perennial, with stout, creeping rootstocks, setaceous leaves, and erect, filiform, rigid culms, 10–20 cm. (4'–8') high. Sheaths mostly basal; ligule 1 mm. ($\frac{1}{8}$ ") long, rounded; leaves rigid, scabrous, the basal ones numerous, 5–12 cm. (2'–5') long. Spikelets 1-flowered, 6–8 mm. ($\frac{3}{8}$ "– $\frac{1}{2}$ ") long, arranged alternately in two rows on one side of the erect rachis (a); first glume very short, adnate to the rachis, sometimes nearly obsolete; flowering glumes (b, c) 6–8 mm. ($\frac{3}{8}$ "– $\frac{1}{2}$ ") long, scabrous, long-acuminate or short-awned.—Introduced at Amherst, Mass.; rocky river banks, Newfoundland. (Europe, Greenland, and Azores.) August.



FIG. 295. **LOLIUM PERENNE** L. Sp. Pl. 83. 1753. RYE-GRASS.—A smooth, leafy perennial 3-9 dm. (1°-3°) high, with slender, terminal spikes 7.5-25 cm. (3'-10') long. Sheaths shorter than the internodes; ligule very short; leaf-blades 5-12 cm. (2'-5') long, 2-4 mm. (1"-2") wide. Spikelets (*a*) about 12 mm. (6") long, 5 to 12 flowered; empty glume much shorter than the spikelet, strongly nerved; flowering glumes (*b*, *c*) 4-6 mm. (2"-3") long, obscurely nerved, acute or acuminate, sometimes awned.—Lawns, fields, and waysides, naturalized, Canada to North Carolina, west to Ohio and Tennessee; California and Arizona. (Europe and Asia.) May to August.

This species is one of the oldest, if not the oldest grass separately cultivated for forage purposes, as it has been in cultivation in England for over 200 years. It is especially valuable for permanent pastures on heavy soils in moist climates. It is a good hay grass where conditions are favorable, but has never been highly esteemed in this country.

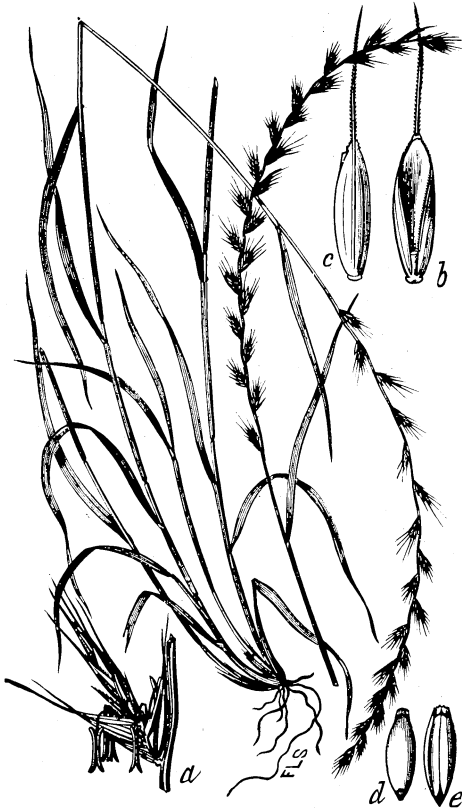


FIG. 296. **LOLIUM ITALICUM** A. Br. Flora, 17 : 259. 1834. ITALIAN RYE-GRASS.—A biennial or perennial grass 6-9 dm. (2° - 3°) high, with slender, usually somewhat nodding, terminal spikes, and short-awned spikelets. Sheaths nearly smooth; ligule very short, scarious; leaf-blades 10-20 cm. (4'-8') long, 4-6 mm. ($2''$ - $3''$) wide. Spikelets (a) 10-15 mm. ($5''$ - $7\frac{1}{2}''$) long, 6 to 15 flowered; flowering glumes (b, c) scabrous near the summit, awned; awn slender, about the length of the glume.—Introduced here and there through cultivation, especially on the Pacific slope.

A valuable hay grass. A well-known and excellent grass for rich and rather moist lands, particularly for the Eastern States. It is a very rapid grower, forms a dense turf, and in Europe, whence it was introduced into this country, it is regarded as one of the best hay grasses. Owing to its succulent character and rapid growth it is one of the best grasses for soiling.

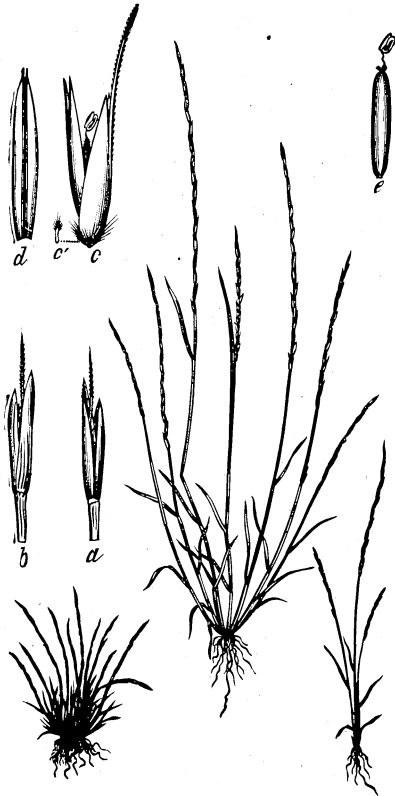


FIG. 297. **SCRIBNERIA BOLANDERI** (Thurb.) Hack. Bot. Gaz. 13: 105. 1888. (*Lepturus bolanderi* Thurb. Proc. Am. Acad. 7: 401. 1868.)—A slender, purplish, wiry, caespitose annual 1-2 dm. (4'-8') high, with short, narrow leaves and terminal, slightly compressed spikes. Spikelets (*a*, *b*) 4-6 mm. (2"-3") long, single or sometimes two at each joint of the rachis; empty glumes very thick except at the scarious margins, flowering glumes (*c*) membranous, keeled, bearing a stout awn between the teeth at the apex. Palea (*d*) hyaline, 2-nerved, 2-keeled, exceeding the glume. Rachilla very short, extended as a short, tufted awn (*c*). The grain is shown by *e*.—Sterile grounds, hillsides, and roadsides, Washington to California. May.



FIG. 298. **AGROPYRON REPENS** (L.) Beauv. Agrost. 146. 1812. (*Triticum repens* L. Sp. Pl. 86. 1753.) **COUCH-GRASS**.—An erect, stoloniferous perennial 3–12 dm. (1° – 4°) high, with flat leaves, which are pilose along the nerves above, and terminal, densely flowered spikes. Sheaths striate, usually smooth; leaf-blades 10–30 cm. (4'–12') long, smooth or scabrous. Spikelets (*a*) green, 3 to 6 flowered; empty glumes (*2*) 5 to 7 nerved, obtuse or notched, acute or short-awned; flowering glumes (*b*) acute or short-awned. Var. **PILOSUM** Scribn. Fl. Mt. Des. Isl. 183, 1894, has the rachis of the spike pubescent or hirsute. Var. **LITTOREUM** Anderss. Pl. Scand. Gram. 5, 1852, with rigid, reddish-green, glaucous leaves, the lower sheaths hirsute, and the glumes awn-pointed—salt marshes, Maine. Var. **AGRESTE** Anderss. l. c. and **NEMORALE** Anderss. l. c. may be found in this country. See U. S. Dept. Agr. Div. Agros. Bul. 4: 36. 1897.—Naturalized in lawns, waysides, and cultivated ground, Newfoundland and Cape Breton to Northwest Territory, south to District of Columbia, Ohio, and Iowa. (Europe and Asia.) June to September.

One of the worst weeds to contend with in the cultivation of hoed crops, but still of value as a hay crop. It is an excellent grass for binding railroad and other embankments subject to wash. The roots are well known in medicine under the name of *Radix graminis*, used as a diuretic.



FIG. 299. **AGROPYRON SCRIBNERI** Vasey, Bul. Torr. Bot. Club, 10: 128. 1893.—A densely caespitose perennial 2-5 dm. (8'-20') high, with ascending culms, flat leaves, and bearded spikes 5-7 cm. (2'-3') long, which readily break up at maturity. Leaf-blades 2-3 cm. (1'-1½') long, 2-4 mm. (1''-2'') wide, rigid, attenuate-pointed; ligule obsolete. Spikelets (a) 3 to 6 flowered, the empty glumes linear-lanceolate, extended above into a long point, 1-2 cm. (¼'-1') long; flowering glumes oblong-lanceolate 8-10 mm. (4''-5'') long, exclusive of the spreading or recurved hispid awn.—Summits of mountains, alt. 1,800-4,200 m. (5,800°-14,000°).—Montana to Colorado and Arizona. August.



FIG. 300. *HORDEUM BOREALE* Scribn. & Smith, U. S. Dept. Agr. Div. Agros. Bul. 4: 24. 1897. NORTHERN WILD BARLEY.—A slender, erect, and apparently perennial grass 3–6 dm. (1° – 2°) high, with rather broad, flat leaves, smooth culms, and terminal spikes 7–10 cm. ($3'$ – $4'$) long. Sheaths shorter than the internodes, the lower ones pubescent; leaf-blades 10–15 cm. ($4'$ – $6'$) long, 4–8 mm. ($2''$ – $4''$) wide, scabrous, long-acuminate, those of the innovations longer. Spikelets in clusters of three (a); empty glumes subequal 14–18 mm. ($7''$ – $9''$) long, setaceous and awn-like; flowering glume of the central spikelet (b) sessile, 10 mm. ($5''$) long, bearing an awn about its own length; flowering glume of the lateral spikelets (c) pedicellate, about 6 mm. ($3''$) long, subulate-pointed or short-awned. The lateral spikelets are raised on curved pedicels about 1.5 mm. ($\frac{3}{4}''$) long.—Mountains of California to Alaska and Bering Sea islands. June, July.

Differs from *H. montanense*, to which it is most closely allied, in its shorter joints of the axis, longer pedicels, lateral spikelets, and setaceous, awn-like empty glumes, and from *H. nodosum* in its greater height, broader leaves, longer spikes, and more completely developed lateral spikelets.



FIG. 301. **ELYMUS ARENARIUS** L. Sp. Pl. 83. 1753. SEA LYME-GRASS.—A stout, erect perennial 6-12 dm. (2° - 4°) high, with extensively creeping root-stocks, rather firm, flat, sharp-pointed leaves and terminal, usually densely flowered spikes 8-25 cm. (3'-10') long. Sheaths glabrous, those at the base overlapping; leaf-blades 8-30 cm. (3'-12') long or more, 3-10 mm. ($1\frac{1}{4}$ "-5") wide, smooth beneath, scabrous above. Spikelets 3 to 6 flowered; empty glumes (a) 16-28 mm. (8'-14") long, acuminate, more or less villous; flowering glumes (b) acute or awn-pointed, 5 to 7 nerved, usually very villous.—In maritime sands, Greenland and Labrador to Maine, Alaska to California, and on the shores of the Great Lakes. (Europe and Asia.) July, August.

This grass is one of the best species known for binding drifting sands, and in northern Europe it has been cultivated with beach-grass (*Ammophila arenaria*) for this purpose, the two species forming an admirable combination. The seeds are used for food by the Digger Indians of the Northwest. It possesses little or no forage value.



FIG. 302. **ASPERELLA HYSTRIX** (L.) Humb. in Roem. and Ust. Mag. Bot. 7: 5. 1790. (*Elymus hystrix* L. Sp. Pl. ed. 2. 124. 1762: *Hystrix patula* Moench. Meth. 295. 1794.) BOTTLE-BRUSH.—A smooth, caespitose perennial 6–12 dm. (2° – 4°) high, with rather broad, flat leaves, and terminal spikes 6–12 cm. ($2\frac{1}{4}$ '–5') long. Sheaths smooth or minutely scabrous above; leaf-blades 12–25 cm. (5'–10') long, 6–16 mm. (3''–8'') wide, scabrous. Spikelets (a) about 1 cm. ($\frac{1}{2}$ ') long, at first erect, but widely spreading in fruit; empty glumes awn-like, usually present in the lower spikelet, which they sometimes equal in length; flowering glumes (b) 8–12 mm. (4''–6'') long, acuminate into a scabrous awn about 2 cm. (1') long.—Fertile, rocky woods, New Brunswick and Ontario to Georgia, Alabama, Arkansas, and Minnesota. June to August.

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